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WAR MACHINE

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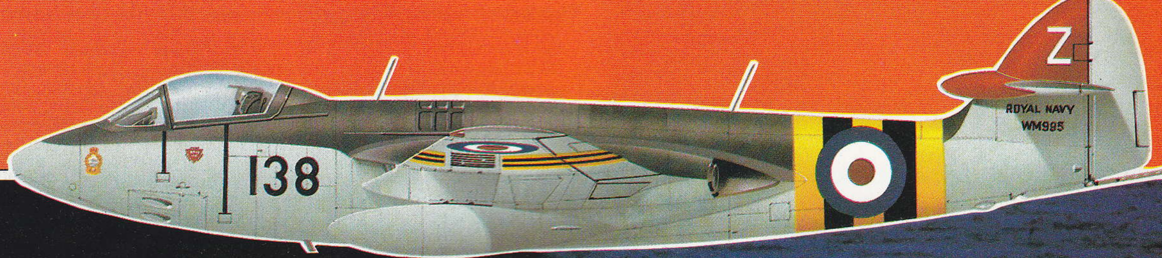

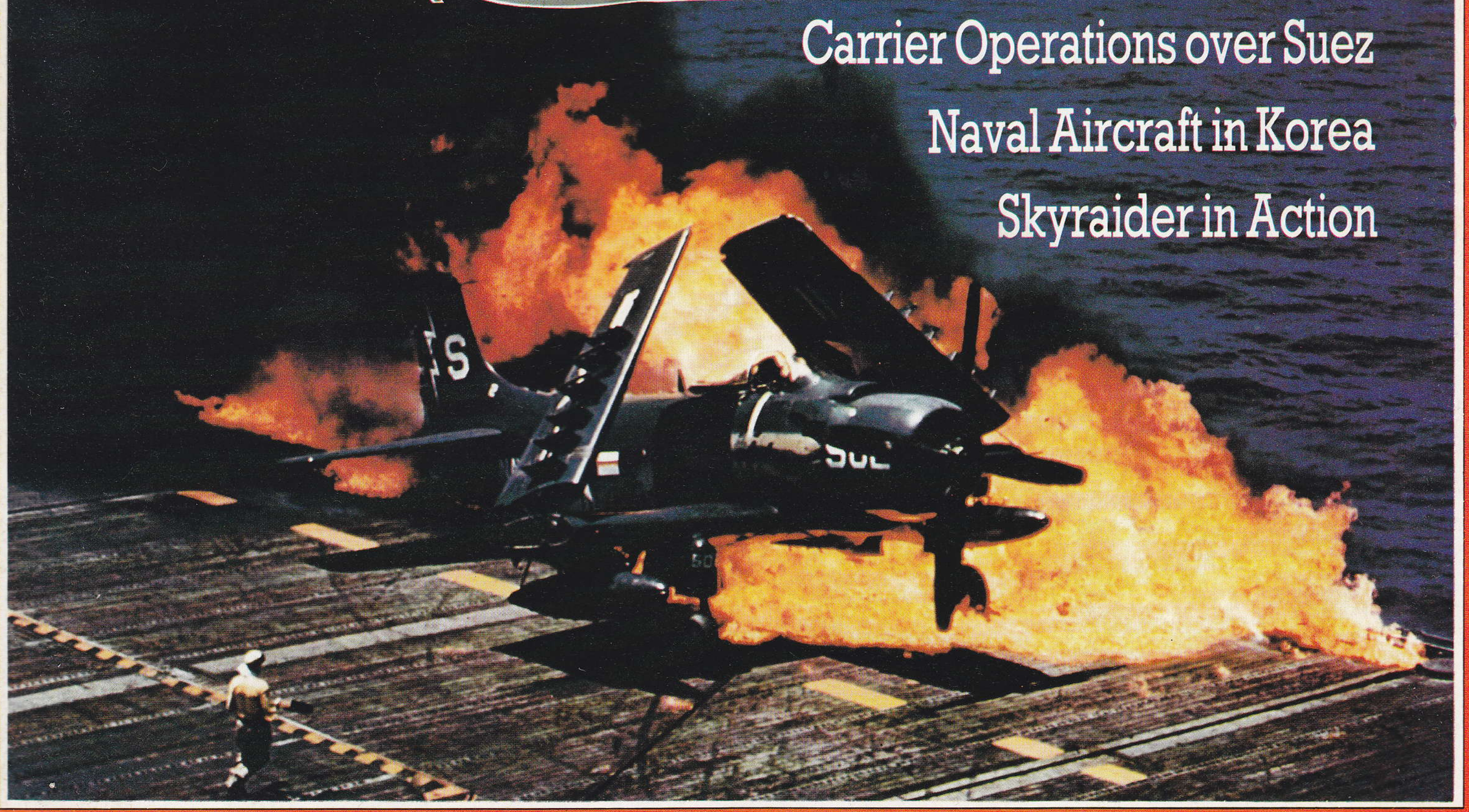

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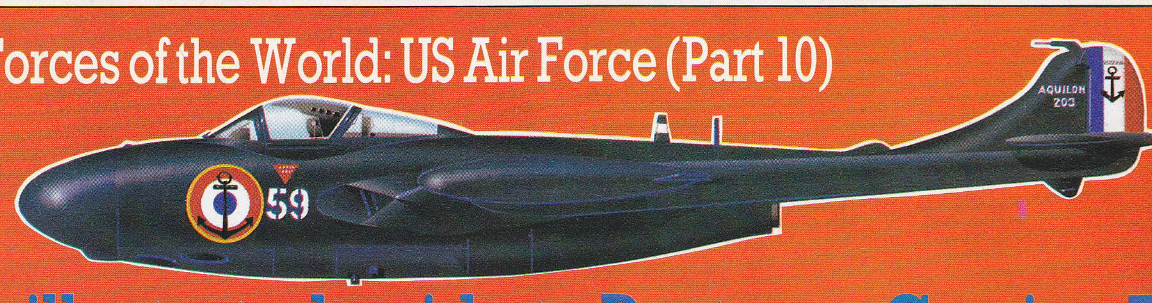

A fully illustrated guide to Post-war Carrier Aircraft

WAR MACHINE

Volume 5 **Issue 55**

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Armed Forces of the World

US Air Force (Part 10) iii

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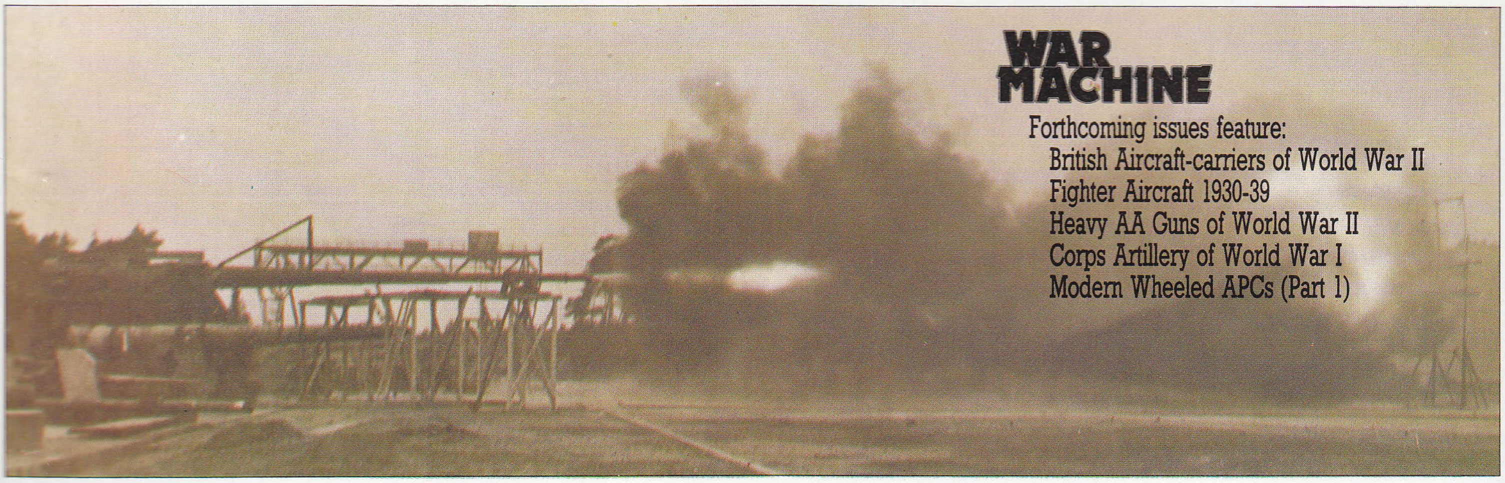

WAR MACHINE

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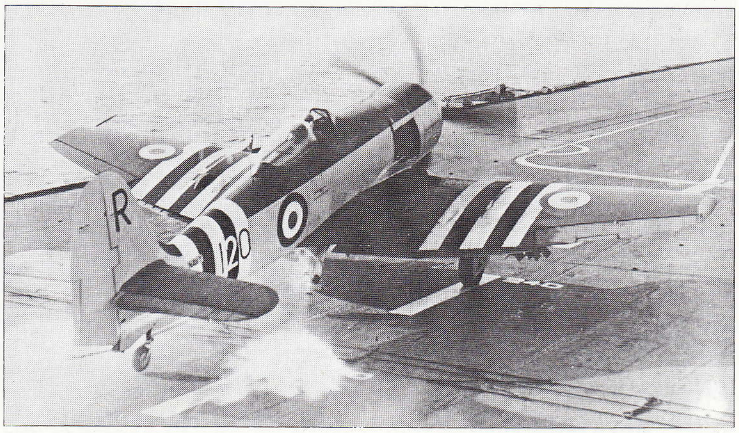
Post-war Carrier Aircraft

Following the triumph of the aircraft-carrier during World War II, naval aviation continued throughout the 1950s as a major component of Western military power. The aircraft advanced in technology as quickly as their land-based counterparts, and were soon back in action over Korea and the Suez Canal.

Immediately after the war, most of the carrier forces employed highly developed piston-engined aircraft such as the Hawker Sea Fury. These were soon joined by jets.



With regard to seaborne aviation the 1950s probably represented the post-war zenith, several nations (including Australia, Canada, France, the Netherlands, UK and USA) all owning and operating aircraft carriers, and also using these on several occasions to project air power across distances of several thousand miles; Korea and Suez represented just two examples of carrier air power at work.

It was also a time of great innovation as far as equipment embarked on these floating airfields was concerned, with jet-powered types beginning to take the place of such war-weary veterans as the Vought Corsair and Supermarine Seafire. Indeed, the decade witnessed a quite remarkable transformation in terms of performance. Nowhere was this change more evident than in the US Navy, which pioneered jet operations at sea: at the start of the 1950s jet aircraft performance was only marginally better than that of the piston era, but by the end of the decade the US Navy had introduced an aircraft capable of sustained supersonic speed in level flight (the Vought F8U Crusader) and was looking ahead to Mach 2 performance with the truly remarkable McDonnell F4H Phantom II.

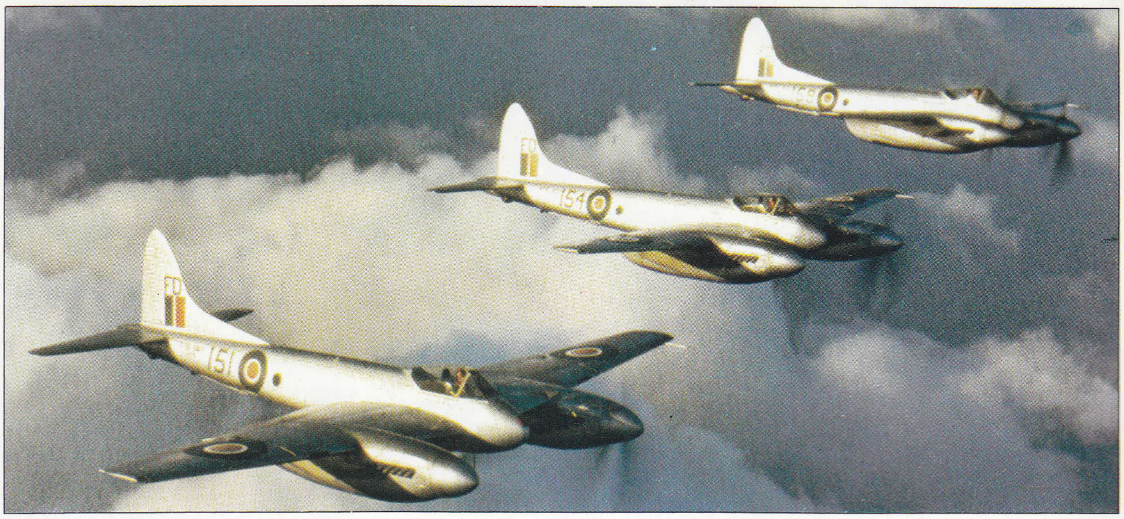
No less significant were the changes embodied in the aircraft-carrier itself, foremost amongst these being the widespread introduction of the steam catapult and the angled deck, both being features which greatly contributed to enhanced safety. In addition, the size of such vessels also grew remarkably. Again, the United States was largely responsible, no less than four examples of the truly massive 'Forrestal' class aircraft-carriers being in active commission by the end of 1959.

Perhaps the most significant conclusion to be drawn (and one which was all too clearly restated in the South Atlantic during 1982) is that the ability of the aircraft-carrier to range the world's oceans means that air power can quickly be brought to bear at the point where it is most needed for the protection of national interests. Paradoxically, though, the constraints placed on defence expenditure throughout the world have witnessed the disappearance of the carrier from all but a handful of navies, an occurrence which certainly gives one pause for thought.

Two generations on from the Sea Fury, the Grumman F9F Cougar featured swept-back wings for improved speed performance. Such aircraft as these paved the way for the later supersonic generation exemplified by the Vought F8U Crusader.

UK

de Havilland Sea Hornet



Used as a long-range fighter and strike aircraft, the de Havilland Sea Hornet F.Mk 20 served aboard the Royal Navy's carriers from 1947 to 1951, when it was replaced by the Sea Venom.

Although bearing a strong family resemblance to the highly successful and versatile Mosquito, the **de Havilland Hornet** was in fact a new design and came about as a private-venture response to the need for a long-range single-seat escort fighter for service in the Pacific. Development began in 1942, the prototype making its maiden flight on 28 July 1944, but like many aircraft which appeared late in World War II the Hornet suffered heavily through post VJ-Day cancellations. Nevertheless, the Hornet's outstanding performance (it was the fastest twin-engine piston-powered fighter to serve with any air arm in the world) saved it from total oblivion, the type being employed by the Royal Air Force in some numbers between 1946 and 1956.

Consideration of the possibility of acquiring a carrier-based variant resulted in the testing of three **Hornet F.Mk 1** aircraft in 1944-5, the third of these being a fully navalized specimen and such was the success of these trials that a production order for 79 **Sea Hornet F.Mk 20** fighters soon followed, deliveries getting under way to No. 801 Squadron in June 1947. Armament was basically similar to that of the RAF Hornet, and this model remained in service until 1951 in a front-line capacity. The next version was the **Sea Hornet NF.Mk 21** night-fighter, whose development began in 1946 although it was not until January 1949 that this attained operational status with the Fleet Air Arm, equipping No. 809 Squadron at Culdrose until 1954, when it finally gave way to jet-powered equipment in the shape of the de Havilland Sea Venom. Subsequently, the Sea Hornet NF.Mk 21 was reassigned to the training of night-fighter radar operators, a task it performed until 1956 when the handful of remaining aircraft were scrapped.

Production of the Sea Hornet was completed with the **Sea Hornet PR.Mk 22** for photographic reconnaissance, about two dozen examples being completed, all of which employed a pair of F52 cameras for use by day and a single K19B camera for night work. In order to undertake the reconnaissance mission, the cannon armament was deleted, its place being filled by cameras.

Specification

de Havilland Sea Hornet F.Mk 20

Type: carrierborne escort and strike fighter

Powerplant: two 2,030-hp (1514-kW) Rolls-Royce Merlin 133/134 inline piston engines

Performance: maximum speed 748 km/h (465 mph) at 6705 m (22,000 ft); service ceiling 10,670 m (35,000 ft); range 2414 km (1,500 miles) with auxiliary fuel

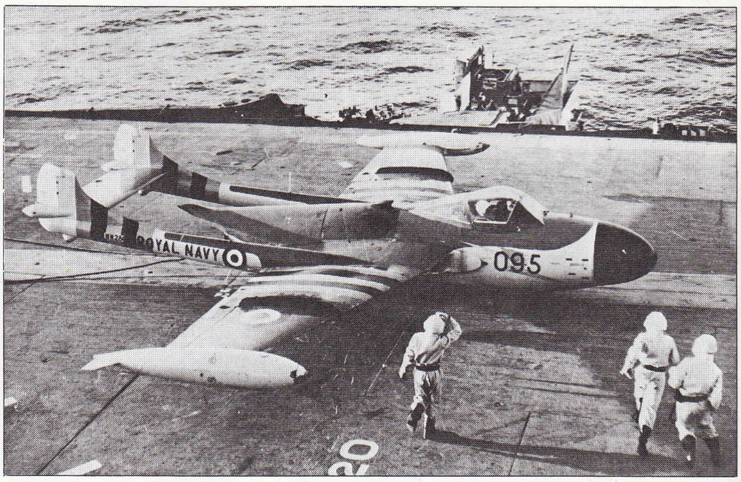
Weights: empty 6033 kg (13,300 lb); maximum take-off 8405 kg (18,530 lb)

Dimensions: span 13.72 m (45 ft 0 in); length 11.18 m (36 ft 8 in); height 4.32 m (14 ft 2 in); wing area 33.54 m^2 (361 sq ft)

Armament: four 20-mm cannon, plus eight 27-kg (60-lb) rockets or two 454-kg (1,000-lb) bombs

UK

de Havilland Sea Venom



De Havilland's Sea Venom was widely employed by the Royal Navy for six or seven years. Its most important combat was during the Suez crisis, when this FAW.Mk 21 was pictured after a wheels-up landing. The fairing over the hook is clearly visible.

Following the evaluation of a standard RAF Venom NF.Mk 2 night-fighter during the course of 1950, the Royal Navy ordered three fully navalized prototype aircraft as the **de Havilland Sea Venom NF.Mk 20**, the first of which made its maiden flight on 19 April 1951. Subsequent carrier compatibility trials conducted aboard HMS *Illustrious* showed that the type possessed considerable promise, and an initial batch of 50 production Sea Venom NF.Mk 20s was contracted, deliveries getting under way during the mid-1950s.

Attaining operational status with No. 890 Squadron aboard HMS *Albion* in July 1955, the Sea Venom NF.Mk 20 was quickly followed by the **Sea Venom FAW.Mk 21**, which used the more powerful Ghost 104 turbojet engine and which was also fitted with American APS-57 airborne interception radar. Deliveries of the Sea Venom FAW.Mk 21 began before the Sea Venom NF.Mk 20 became operational, the delivery beginning in May 1955 of what eventually became the most widely used version, a total of 167 being built for service with the Fleet Air Arm. Production of the Sea Venom was completed with 39 examples of the **Sea Venom FAW.Mk 22**, which differed mainly by virtue of being powered by the Ghost 105 turbojet.

Like other Fleet Air Arm aircraft of this era, the Sea Venom was in action in the Suez Crisis, being employed against targets in the Canal Zone, but its combat swan-song came in 1960 when No. 891 Squadron's Sea Venom FAW.Mk 22s flew a number of missions against Yemeni rebels in Aden. Shortly afterwards the Sea Venom was retired from the front-line inventory, although some continued to fly with second-line elements until 1970.

In addition to service with the Fleet Air Arm, 39 **Sea Venom FAW.Mk 53** aircraft were exported to Australia in 1955 whilst about 80 aircraft were built under licence by Sud-Est in France, where the type was known as the **Aquilon**. Based on the Sea Venom NF.Mk 20, the Aquilon served with the Aéronavale from 1955 to 1965, some aircraft being configured to carry the Nord 5103 air-to-air missile. Following delivery of the Vought F-8E(FN) Crusader, surviving Aquilons were relegated to secondary duties.

Specification

de Havilland Sea Venom FAW.Mk 21

Type: carrierborne all-weather fighter

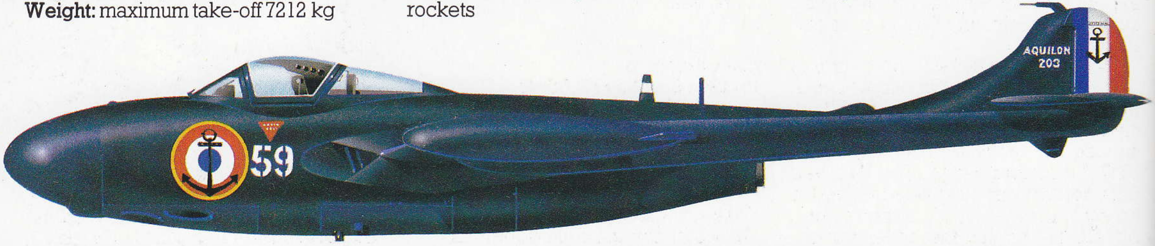
Powerplant: one 2245-kg (4,950-lb) thrust de Havilland Ghost 104 turbojet

Performance: maximum speed 1014 km/h (630 mph) at sea level; service ceiling 14995 m (49,200 ft); range 1609 km (1,000 miles)

Weight: maximum take-off 7212 kg (15,900 lb)

Dimensions: span 13.08 m (42 ft 11 in); length 11.15 m (36 ft 7 in); height 2.59 m (8 ft 6 in); wing area 25.99 m^2 (279.75 sq ft)

Armament: four 20-mm cannon, plus up to 907 kg (2,000 lb) of external ordnance including bombs and rockets



Fastest of all the naval Venoms was the French Sud-Est Aquilon 203. This example served with Aéronavale Flottille 16F and was later armed with the Nord 5103 command-guidance air-to-air missile.

UK

Fairey Firefly

After serving with distinction in the closing months of World War II, the Fairey Firefly continued to give valuable service for several years. These Firefly FR.Mk 4s are seen in company with a trio of Sea Furies.

One of the most successful World War II designs to originate in the UK, the **Fairey Firefly** initially entered service in 1943 and racked up an impressive combat record in World War II. Notable highlights included the attack on the German battleship *Tirpitz* and a series of strikes on mainland Japan shortly before VJ-Day brought hostilities to a conclusion. In the post-war era, the Firefly demonstrated a considerable degree of versatility, turning its hand to other duties such as target towing and anti-submarine warfare as well as continuing in its primary function of fighter-bomber. By the time production ceased 1,702 had been built, some remaining active with the Fleet Air Arm until as late as 1957 whilst others served with Australia, Canada, Denmark, Ethiopia, India, the Netherlands, Sweden and Thailand.

Post-war production initially involved the **Firefly FR.Mk 4** reconnaissance fighter, which flew for the first time on 25 May 1945. Incorporating a number of new features such as clipped wingtips and redesigned tail surfaces, 160 were completed by early 1948, and these saw service with several Fleet Air Arm squadrons, some later being modified to **Firefly TT.Mk 4** standard for target-towing duty. The next basic model to appear was the Mk 5, variants including the **Firefly NF.Mk 5** night-fighter, the **Firefly FR.Mk 5** day reconnaissance fighter and the **Firefly AS.Mk 5** anti-submarine patrol aircraft; the last eventually became the most numerous post-war version, over 300 being produced between 1947 and 1950. Production then switched to the three-seat **Firefly AS.Mk 6**, which entered service in 1951, the 149 aircraft built eventually equipping six front-line and six reserve squadrons, and these were followed in 1952 by the **Firefly AS.Mk 7**. Only 36 were completed to this standard, the remaining 160 Mk 7s all being **Firefly T.Mk 7** trainers. Firefly production eventually terminated in March 1956 with the delivery of the last of 24 new-build **Firefly U.Mk 8** target drones, but 54 Mk 5s were also converted to this mission, these being known as **Firefly U.Mk 9** aircraft.

Operationally, British Fireflies of various marks saw considerable post-war action, taking part in the Malayan confrontation between 1949 and 1954 as well as the Korean War, whilst the Dutch **Firefly FR.Mk 1** aircraft undertook combat duty against rebel forces in the Dutch East Indies.

Specification

Fairey Firefly FR.Mk 4

Type: carrierborne reconnaissance fighter

Powerplant: one 2,245-hp (1674-kW) Rolls-Royce Griffon 74 inline piston engine

Performance: maximum speed 591 km/h (367 mph) at 4265 m (14,000 ft); service ceiling 9725 m (31,900 ft); range 2148 km (1,335 miles)

Weights: empty 4388 kg (9,674 lb); maximum take-off 7083 kg (15,615 lb)

Dimensions: span 12.55 m (41 ft 2 in); length 11.58 m (38 ft 0 in); height 4.24 m (13 ft 11 in); wing area 30.66 m^2 (330 sq ft)

Armament: four 20-mm cannon, plus 16 27-kg (60-lb) rockets or two 454-kg (1,000-lb) bombs

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UK

Hawker Sea Fury

First conceived as a long-range fighter for use by the Royal Air Force in the Pacific against the Japanese, Hawker's initial design was known originally as the Tempest Light Fighter. It very quickly generated considerable Royal Navy interest which led to the issue of a formal specification in February 1943, this being followed in April 1944 by an order for 400 aircraft to be shared equally by the RAF and the Fleet Air Arm.

The first example to fly was the RAF's Fury Mk 1 on 1 September 1944, whilst the **Hawker Sea Fury** prototype took to the air for its maiden flight on 21 February 1945. However, the return of peace led to large-scale defence cutbacks, Hawker's newest fighter suffering badly with all the RAF examples and half of the Royal Navy aircraft being cancelled, although the manufacturer did ultimately achieve modest export sales of the land-based Fury, customers including Egypt, Iraq and Pakistan.

As far as the Royal Navy's aircraft was concerned, this first flew in production form as the **Sea Fury F.Mk 10** on 7 September 1946, duly entering service with No. 807 Squadron in July 1947. Manufacture of the Sea Fury as a pure fighter was, however, destined to be short-lived and only 50 were completed, production thereafter switching to the **Sea Fury FB.Mk 11** fighter-bomber derivative which could carry up to 907 kg (2,000 lb) of external ordnance and which also featured a lengthened arrester hook plus provision for rocket-assisted take-off gear. This variant became the definitive Sea Fury, deliveries beginning in May 1948, and by the time the line closed in the early 1950s some 515 had been completed, as well as 60 examples of the **Sea Fury T.Mk 20** two-seat trainer. By then the Sea Fury had also been engaged in combat in Korea, where it proved to be an excellent ground-attack platform as well as no mean performer in air-to-air combat, emerging victorious over the jet-powered MiG-15 on at least two occasions.

By the mid-1950s the Sea Fury had been supplanted by more modern types with the Fleet Air Arm, but some export Sea Furies continued to fly with the air arms of Australia, Burma, Canada, Cuba and the Netherlands for a few more years.

Specification

Hawker Sea Fury FB.Mk 11

Type: carrierborne fighter-bomber

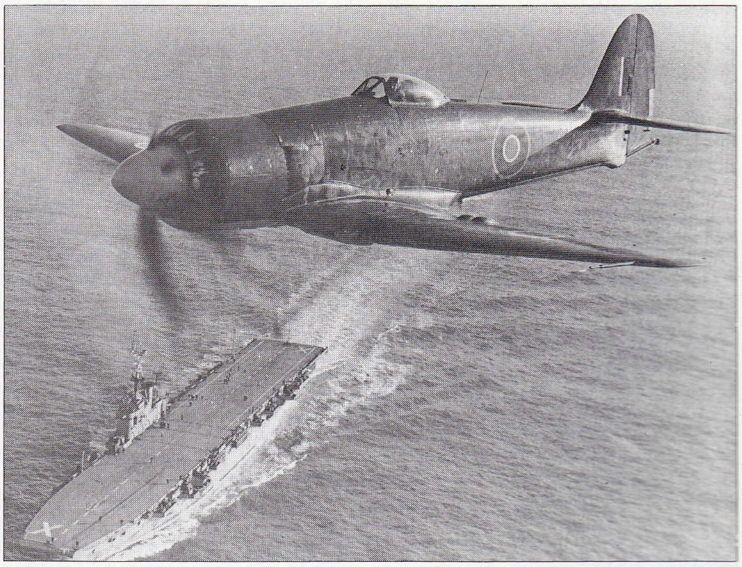
Powerplant: one 2,480-hp (1849-kW) Bristol Centaurus 18 radial piston engine

Performance: maximum speed 740 km/h (460 mph) at 5485 m (18,000 ft); service ceiling 10910 m (35,800 ft); range 1127 km (700 miles) on internal fuel

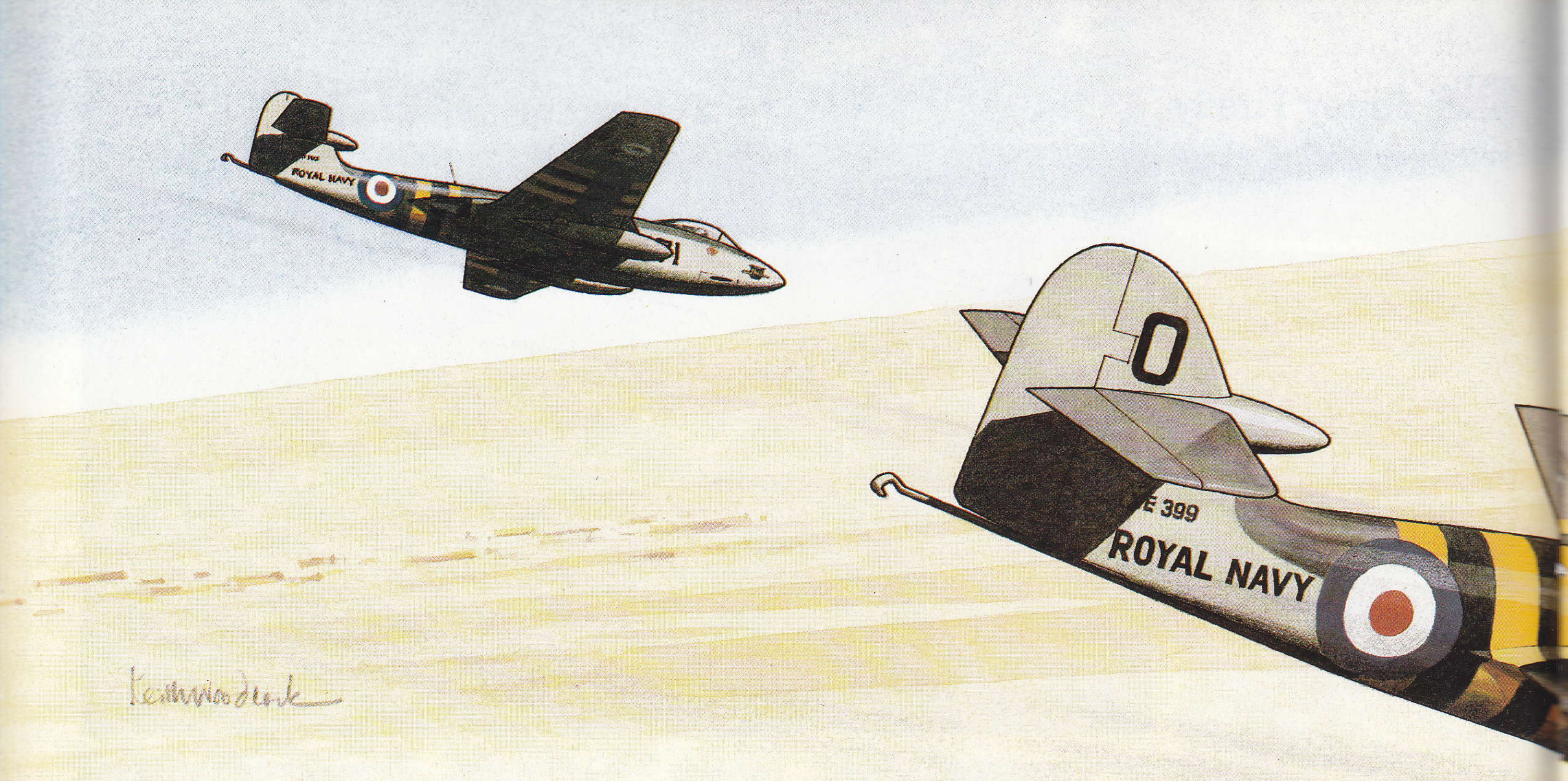
Weights: empty 4191 kg (9,240 lb); maximum take-off 5670 kg (12,500 lb)

Dimensions: span 11.70 m (38 ft 4.75 in); length 10.57 m (34 ft 8 in); height 4.84 m (15 ft 10.5 in); wing area 26.0 m^2 (280 sq ft)

Armament: four 20-mm cannon, plus up to 907 kg (2,000 lb) of external ordnance including bombs, rockets and mines



Representing the pinnacle of piston-engined fighter design, the Hawker Sea Fury FB.Mk 11 was powered by an 18-cylinder two-row radial which gave the aircraft a top speed of over 700 km/h (435 mph). It saw much action in Korea and claimed a few MiG victories.



Carrier Operations over Suez

As a result of the limited effectiveness of high-level bomber attacks on Egyptian airfields by the Royal Air Force, operations in Suez changed dramatically, with carrier aircraft used for the first time from HMS Eagle, Bulwark and Albion and the French carrier Arromanches.

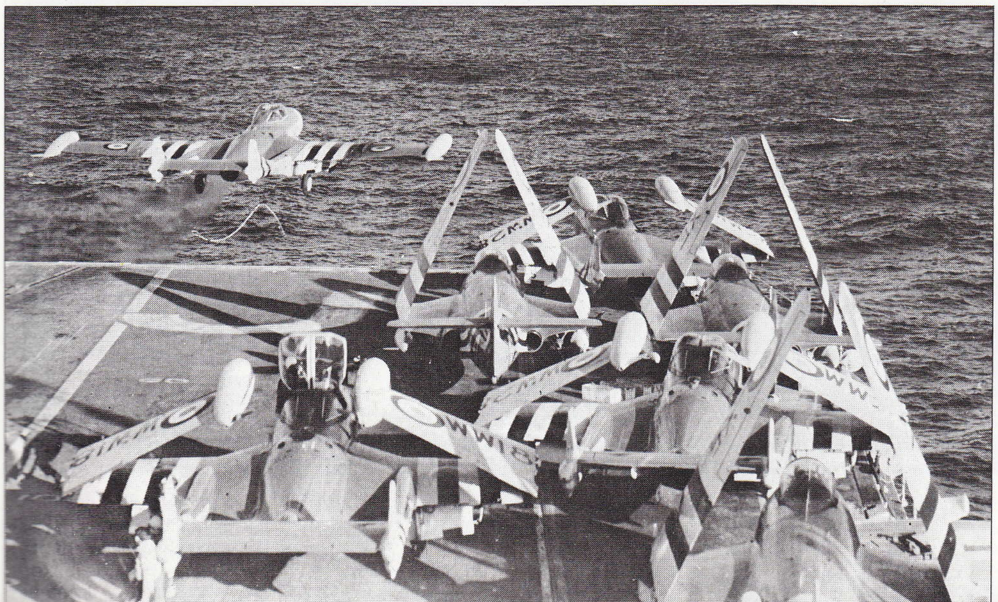
The name Suez is hardly mentioned in British history books, because it is now considered an ignoble defeat. In fact the concerted action by the UK, France and Israel against Egypt was most professionally handled from the military viewpoint; it was the politicians who faltered, and within 24 hours of completing the operation.

At the end of July 1956 Colonel G.A. Nasser, Egypt's new dictator, tore up a long-standing treaty with the UK and France (who had financed and built the Suez Canal, and legally still owned it) and announced it had been nationalized by Egypt. In those days such an act was likely to bring a firm response, and in 24 hours an Anglo-French command structure had been agreed and preparations were in hand for Operation 'Musketeer' ('Mousquetaire') to recover the canal by force. So-called 'collusion' with Israel was denied, but if so it was a remarkable coincidence that the aircraft of all three countries were painted in the last days of October 1956 with the same black/yellow 'invasion stripes' in a parody of those used during Operation 'Overlord' in June 1944!

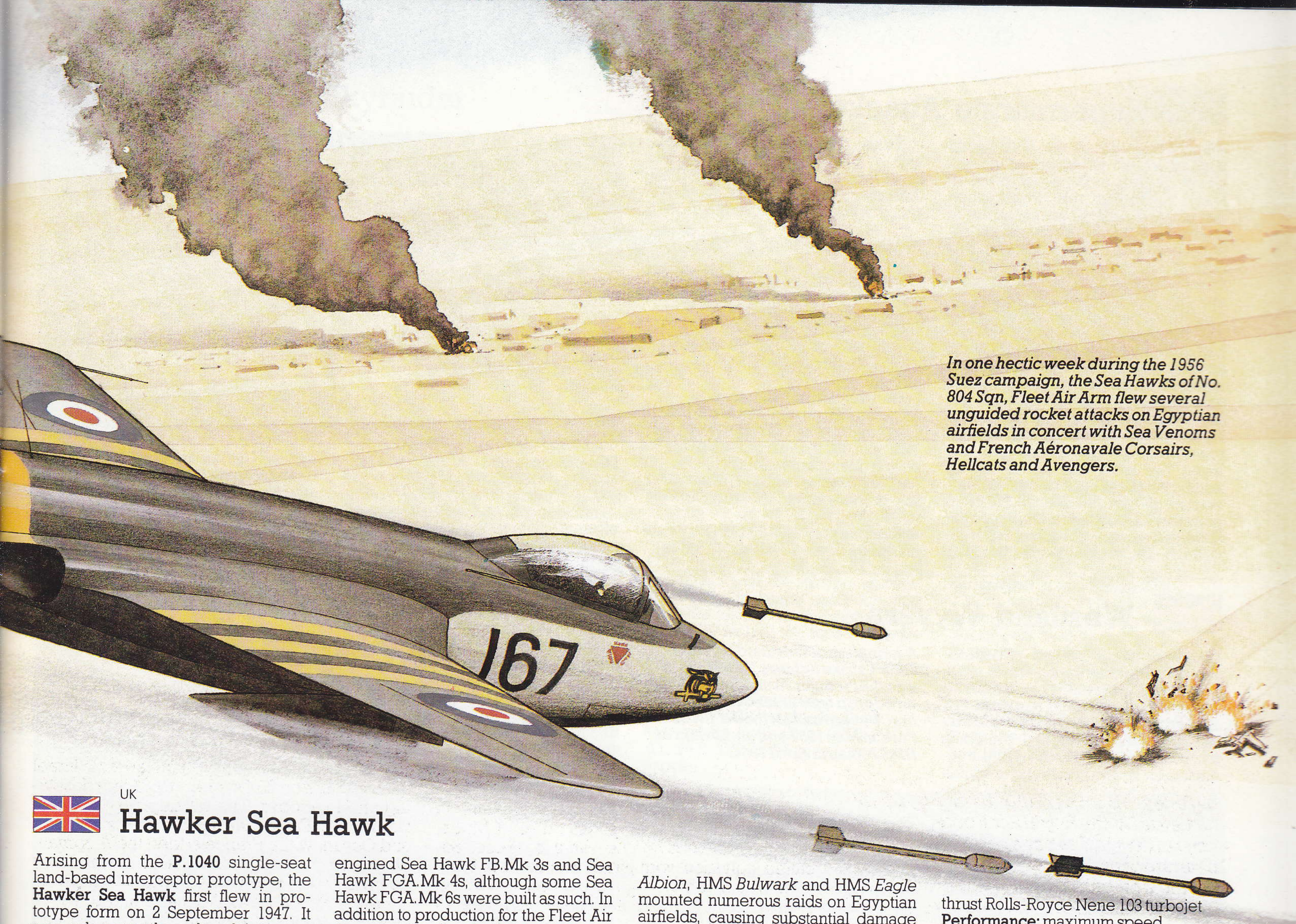
Many shore-based aircraft of the UK and France operated from Cyprus, while RAF English Electric Canberra B.Mk 6 and Vickers Valiant bombers (the latter from Nos 138, 148, 207 and 214 Sqns) operated from Malta against airfields and other Egyptian targets. Israel attacked late on 29 October, the 'Allies' following on 31 October. The UK deployed the carriers HMS *Eagle, Bulwark, Theseus, Albion* and *Ocean*, while France added the *Arromanches* and *Lafayette*. The chief Royal Navy fighters involved were the Hawker (Armstrong Whitworth) Sea Hawk Mks 4, 5 and 6, which were flown by Nos 800, 802, 804, 810, 897 and 899 Sqns from the *Albion, Bulwark* and *Eagle*. They operated mainly in 'cab-rank' style, again reminiscent of the fighting over Normandy in 1944, being called up to attack pockets of resistance confronting British troops and using guns, bombs and rockets with great precision.

Though their prime purpose was night and all-weather interception, the de Havilland Sea Venom FAW.Mk 21s also made a major contribution to the ground-attack and close-support operations, flying in conjunction with RAF Venom FB.Mk 4s based on Cyprus. The Sea Venoms came from Nos 809, 891, 893, 894 and 895 Sqns, embarked aboard the *Albion* and *Eagle*. Like the Sea Hawks they used 20-mm guns, bombs of up to 454-kg (1,000-lb) size and eight 27.2-kg (60-lb) rockets, depending on the nature of the target. Yet a further contribution to the thousands of tactical attack sorties was made by the big turboprop Westland Wyverns S.Mk 4s of Nos 830 and 831 Sqns, operating from the *Eagle*, each of which could carry three large bombs or 16 rockets,

Among the numerous tactical aircraft flown by France and Israel were Dassault Ouragans and Mystères, Republic F-84G Thunderjets and F-84F Thunderstreaks, North American P-51D Mustangs and Gloster Meteors. But a completely new element in air warfare was provided by the Westland Whirlwind (and MDAP-supplied S-55) helicopters of the Royal Navy which, operating from the *Ocean* and *Theseus*, landed Royal Marine No. 45 Commando on the beach at Port Said, subsequently bringing supplies and even VIP visitors, but Soviet and US pressure forced a ceasefire on 7 November.



Wearing distinctive black and yellow stripes, the Fleet Air Arm's Sea Venoms and Sea Hawks carried out several attacks on Egyptian airfields with devastating accuracy. Here a Sea Venom FAW.Mk 21 leaves a crowded flight deck for another mission.



In one hectic week during the 1956 Suez campaign, the Sea Hawks of No. 804 Sqn, Fleet Air Arm flew several unguided rocket attacks on Egyptian airfields in concert with Sea Venoms and French Aéronavale Corsairs, Hellcats and Avengers.

UK

Hawker Sea Hawk

Arising from the **P.1040** single-seat land-based interceptor prototype, the **Hawker Sea Hawk** first flew in prototype form on 2 September 1947. It was subsequently ordered into production as the **Sea Hawk F.Mk 1**, this being a pure fighter variant powered by a single Rolls-Royce Nene 101 turbojet engine rated at 2268-kg (5,000-lb) thrust. Early development of the Sea Hawk was a protracted process, and it was not until 1953 that it began to enter service with the Fleet Air Arm, ultimately equipping most front-line units and providing the backbone of British naval air power for much of the remainder of the 1950s.

In the event, Hawker's other main project (the classic Hunter) rather overshadowed the Sea Hawk, and indeed this type was responsible for Sea Hawk production being entrusted to Armstrong Whitworth Aircraft from the **Sea Hawk F.Mk 2** version onwards. Progressive development of the basic design led to the appearance of rather more versatile variants, the first of these being the **Sea Hawk FB.Mk 3**, which featured a strengthened wing structure, enabling it to carry bombs, rockets or auxiliary fuel tanks, and this was soon followed by the **Sea Hawk FGA.Mk 4** optimized for use in the demanding ground-attack role. Adoption of the more powerful Nene 103 turbojet engine in 1956 led to the **Sea Hawk FB.Mk 5** and **Sea Hawk FGA.Mk 6** derivatives, these basically being re-engined Sea Hawk FB.Mk 3s and Sea Hawk FGA.Mk 4s, although some Sea Hawk FGA.Mk 6s were built as such. In addition to production for the Fleet Air Arm, the Sea Hawk also found favour with the naval air arms of India, the Netherlands and West Germany, some of the Indian machines still being active at the time of writing, although replacement by Sea Harriers is imminent.

As far as operational service with the Royal Navy is concerned, the highlight must surely have been the Suez Canal crisis of 1956 when six squadrons flying from the carriers HMS *Albion*, HMS *Bulwark* and HMS *Eagle* mounted numerous raids on Egyptian airfields, causing substantial damage for the loss of only two aircraft in a week of quite intense activity. By 1960, however, the availability of newer and more sophisticated types such as the Supermarine Scimitar and de Havilland Sea Vixen resulted in retirement of the Sea Hawk by the Fleet Air Arm.

Specification

Hawker Sea Hawk FGA.Mk 6

Type: carrierborne fighter-bomber

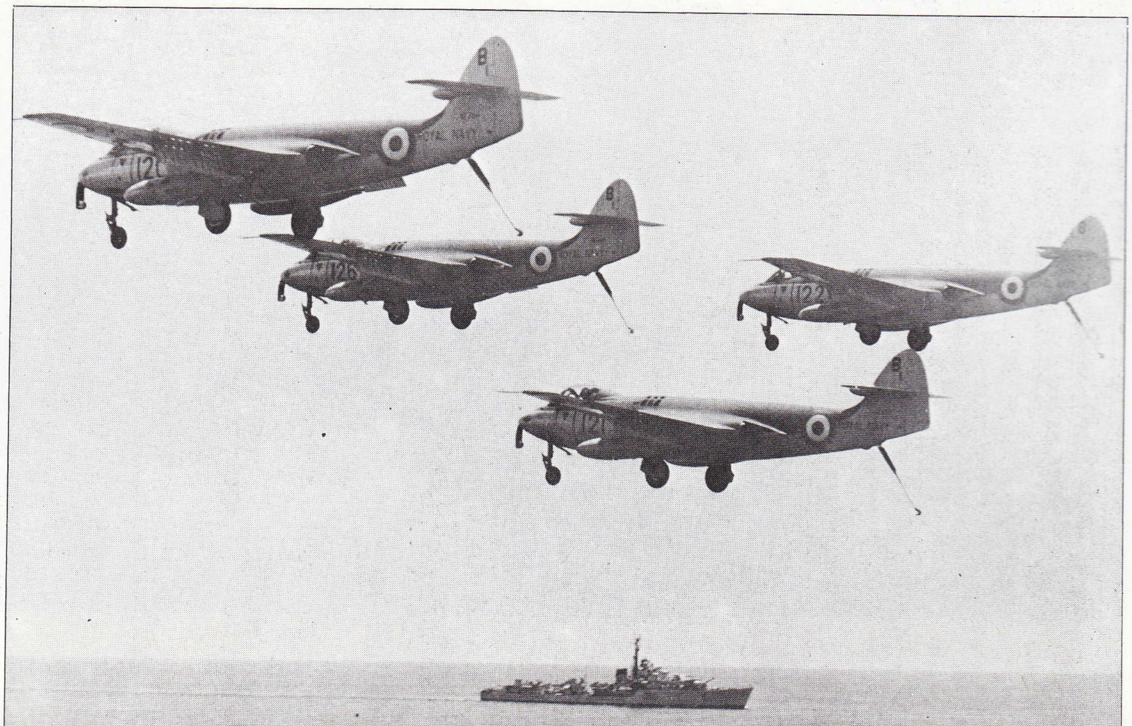
Powerplant: one 2359-kg (5,200-lb) thrust Rolls-Royce Nene 103 turbojet

Performance: maximum speed 945 km/h (587 mph) at 6095 m (20,000 ft); service ceiling 13565 m (44,500 ft); range 1287 km (800 miles) with auxiliary fuel

Weights: empty 4672 kg (10,300 lb); maximum take-off 6895 kg (15,200 lb)

Dimensions: span 11.89 m (39 ft 0 in); length 12.09 m (39 ft 8 in); height 2.64 m (8 ft 8 in); wing area 25.83 m^2 (278 sq ft)

Armament: four 20-mm cannon, plus two 227-kg (500-lb) bombs or 20 76-mm (3-in) rockets



Four Sea Hawks from No. 801 Sqn flying from HMS Bulwark *perform a slow flypast for the camera, showing clearly the flap arrangement and the long arrester hook in fully deployed position.*

UK

Supermarine Attacker

After World War II the UK's hectic pace of aircraft development slowed almost to a halt, as the government invoked a 'ten-year rule' which stated there would be a 10-year warning of any emergency, so new equipment was not urgent. This philosophy was dented by the Berlin Airlift and shattered by Korea in June 1950, and by this time the Fleet Air Arm's first jet fighter had been in the air two months. The **Supermarine Attacker** prototype had been built to a 1944 specification, using a new Nene-engined fuselage mounted on the wings of the Spiteful with radiators removed. The result was the **Attacker F.Mk 1**, a mediocre fighter whose main advantages were cheapness and easy handling at low level. The latter was put to use by adding bombs in the **Attacker FB.Mk 1** version, and the **Attacker FB.Mk 2** had powered ailerons and a stronger metal-framed canopy. The last of 145 of the three marks was delivered in 1953, and these served with No. 736 training and Nos 800,803 and 890 first-line squadrons from late 1951 until 1955, thereafter continuing with the RNVR until that force was disbanded in 1957.

Specification

Supermarine Attacker FB.Mk 2

Type: single-seat carrier-based fighter-bomber

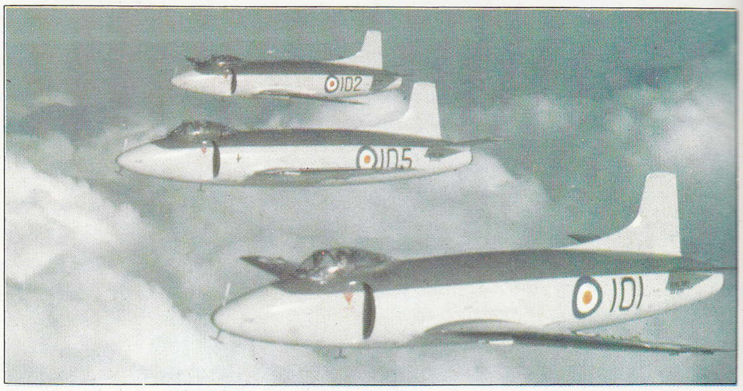
Powerplant: one 2313-kg (5,100-lb) thrust Rolls-Royce Nene Mk 102 turbojet

Performance: maximum speed 950 km/h (590 mph) at sea level; initial climb (light weight 5216 kg/11,500 lb) 1935 m (6,350 ft) per minute; service ceiling (maximum weight) 11890 m (39,000 ft); range (with 1137-litre/250-Imp gal belly tank) 1700 km (1,060 miles)

Weights: empty 4495 kg (9,910 lb); maximum take-off 7938 kg (17,500 lb)

Dimensions: span 11.26 m (36 ft 11 in); length 11.43 m (37 ft 6 in); height 3.03 m (9 ft 11 in); wing area 21 m^2 (226 sq ft)

Armament: four 20-mm Hispano Mk 5 cannon, plus provision for two 454-kg (1,000-lb) bombs or eight rockets



Britain's first naval jet to reach a squadron, the Supermarine Attacker was also exported to Pakistan. The wing was developed from that flown on the Spiteful, which had in turn been developed from the Spitfire.

UK

Westland Wyvern

Unique in being the only turboprop-powered naval strike fighter to attain operational status, the **Westland Wyvern** came about in response to a 1944 specification, but was plagued by numerous developmental problems that conspired to delay the type's introduction for several years and eventually limited production in favour of more reliable jets such as the Hawker Sea Hawk.

Early Wyverns were fitted with Rolls-Royce Eagle piston engines, but following the RAF's decision to proceed no further with this project the Royal Navy opted to concentrate all future development around the Armstrong Siddeley Python turboprop engine, the first of two prototypes with this powerplant taking to the air on 22 March 1949. Subsequent testing was drawn out, with the result that some three years passed before examples of the Wyvern reached Fleet Air Arm trials squadrons, and it was not until September 1953 that the type became operational with No. 813 Squadron. Even then, more time seems to have been spent ashore than at sea although operations were conducted from HMS *Albion* and HMS *Eagle* during the first year of service.

The principal production model was the **Wyvern S.Mk 4**, 94 being built in the early to mid-1950s, and these were augmented by a number of **Wyvern TF.Mk 2** aircraft modified to Wyvern S.Mk 4 standard. In addition, a solitary **Wyvern T.Mk 3** trainer was also completed although no production orders were forthcoming from the Fleet Air Arm which, one suspects, rather regretted proceeding with the Wyvern in the first place.

By the spring of 1958 the Wyvern had all but disappeared from the scene, but not before gaining its brief moment of glory in the Suez crisis of 1956 when No. 830 Squadron flew many strikes against targets in Egypt, losing two aircraft to ground fire in the process.

Specification

Westland Wyvern S.Mk 4

Type: carrierborne strike fighter

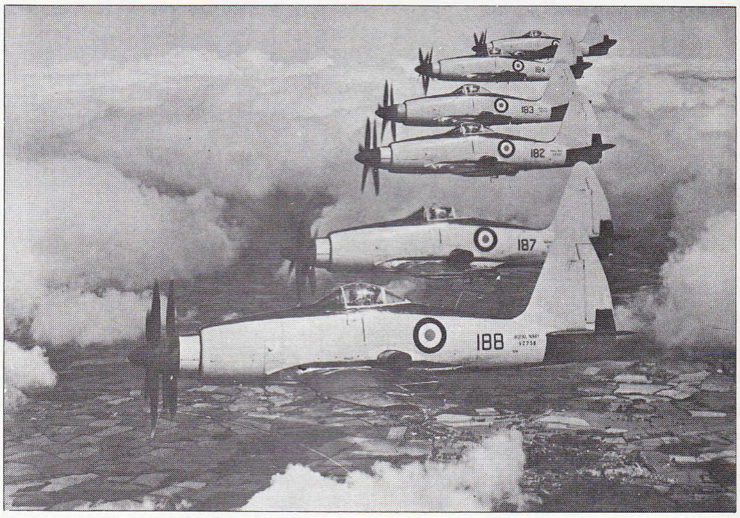
Powerplant: one 4,110-eshp (3065-ekW) Armstrong Siddeley Python ASP3 turboprop

Performance: maximum speed 616 km/h (383 mph) at sea level; service ceiling 8535 m (28,000 ft); range 1455 km (904 miles) with auxiliary fuel

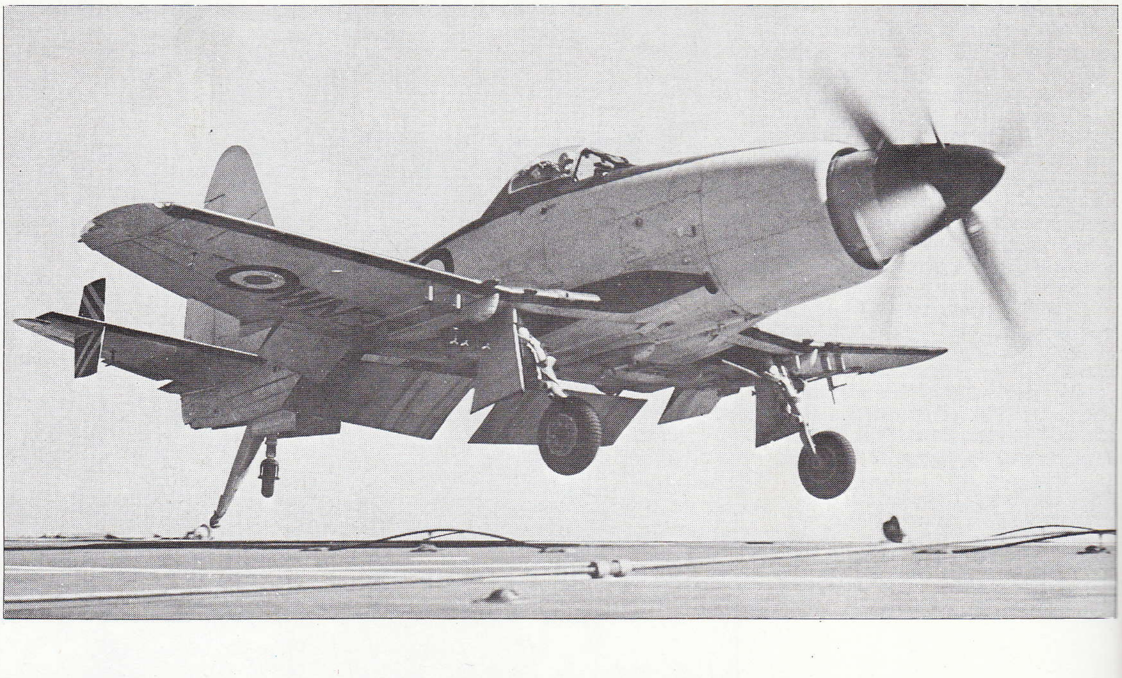
Weights: empty 7080 kg (15,608 lb); maximum take-off 11113 kg (24,500 lb)

Dimensions: span 13.41 m (44 ft 0 in); length 12.88 m (42 ft 3 in); height 4.80 m (15 ft 9 in); wing area 32.98 m^2 (355 sq ft)

Armament: four 20-mm cannon, plus up to 1361 kg (3,000 lb) of external ordnance including bombs and rockets



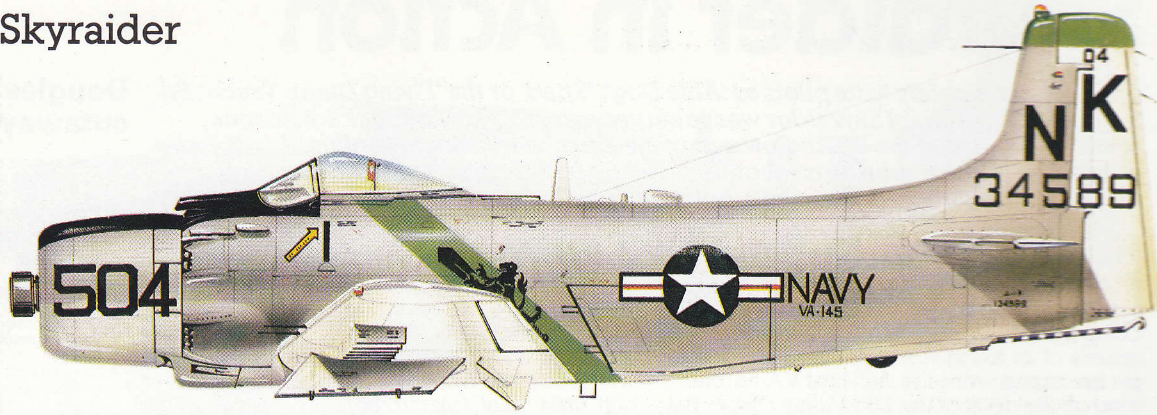
A formation of Westland Wyvern S.Mk 4 strike fighters. The Wyvern was the Fleet Air Arm's first turboprop type to see service. The first Wyvern unit formed at RNAS Ford in May 1953 and embarked on HMS Albion in April 1954.



Below: A Westland Wyvern S.Mk 4 landing on HMS Eagle. *During 1956 No. 830 Sqn, aboard HMS* Eagle, *became the only Wyvern unit to see operational service when it was involved at Suez.*

USA

Douglas AD Skyraider



BuAer No. 134589 was a straightforward AD-6 which was redesignated A-1H in 1962. It served until 1965 with VA-145 from USS Constellation *off the coast of Vietnam.*

No survey of carrier aircraft of the 1950s would be complete without some reference to the **Douglas AD Skyraider**, a type which was conceived during World War II. Arriving on the scene too late to participate in that conflict, the Skyraider underwent its combat baptism of fire over Korea and was still very much a part of the US Navy's front-line inventory more than 10 years later when the Vietnam War began, surpassing earlier achievements by being responsible for the destruction of two MiGs in air-to-air combat.

Originally conceived in 1944 as a replacement for the tried and tested Douglas SBD Dauntless dive-bomber, the Skyraider entered service with Attack Squadron VA-1B in 1947, this marking the start of a career spanning some 23 years during which it demonstrated an as-yet unparalleled versatility. Equally adept at airborne early warning, electronic countermeasures, bombing, close air support, target towing, troop carrying and even VIP transport, no less than 3,180 Skyraiders were completed between 1945 and February 1957, when the assembly line finally closed. These aircraft saw service with the US Air Force, the US Navy and the US Marine Corps as well as overseas air arms including those of France, South Vietnam and the UK.

Flown for the first time in prototype form as the **XBT2D-1** on 18 March 1945, the type was ordered into production just one month later but soon suffered from VJ-Day cutbacks which at one time seemed likely to threaten the future of the whole project. Fortunately, it survived early vicissitudes and by the end of the Korean War had, in the words of Rear Admiral John Hoskins, commanding Task Force 77, become 'the best and most effective close support aircraft in the World'.

Space does not permit close examination of individual variants (there were at least 28) but in addition to single-seat attack aircraft such as the **AD-1, AD-6** and **AD-7**, there was also the multi-place **AD-5** which was perhaps the most interesting Skyraider of all in that it could by means of packaged conversion kits be reconfigured for different missions within just a matter of hours. Flown for the first time in August 1951, variants of the AD-5 subsequently performed AEW (**AD-5W**), ECM (**AD-5Q**), day attack (**AD-5**) and night attack (**AD-5N**) missions amongst other tasks, making it easily the most versatile model of this remarkable warplane. In 1962 the type was redesignated **A-1**.

Specification

Douglas AD-7 Skyraider

Type: carrierborne attack aircraft
Powerplant: one 3,050-hp (2274-kW) Wright R-3350-26WB radial piston engine
Performance: maximum speed 552 km/h (343 mph) at 6095 m (20,000 ft); service ceiling 7740 m (25,400 ft); range 2092 km (1,300 miles)
Weights: empty 5486 kg (12,094 lb); maximum take-off 11340 kg (25,000 lb)
Dimensions: span 15.25 m (50 ft 0.25 in); length 11.84 m (38 ft 10 in); height 4.78 m (15 ft 8.25 in); wing area 37.2 m^2 (400.33 sq ft)
Armament: four 20-mm cannon, plus up to 3629 kg (8,000 lb) of external ordnance on 15 hardpoints

The Douglas AD was the main US Navy attack aircraft during the 1950s and 1960s. This example is an AD-7 (A-1J).

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Skyraider in Action

Known affectionately to its pilots as 'Able Dog', 'Spad' or the 'Flying Dump Truck', Ed Heinemann's brilliant Skyraider was to serve on the US Navy's attack squadrons until 1968, and with the US Air Force until the end of the Vietnam conflict. Korea was its first combat use, where its toughness, agility and phenomenal load-carrying were plain for all to see. These attributes were to be seen in many parts of the world for the next 20 years, every action adding to the legend that was 'Skyraider'.

When North Korean forces crossed the 38th parallel on 25 June 1950, the Douglas Aircraft Company was already into the fourth series of models of its tough AD Skyraider. The first to get into action were the AD-4s of VA-55, operating off the deck of the USS *Valley Forge*. But VA-55 had already seen a kind of action with its capable midnight blue birds. The US Navy was battling for funds against the USAF, and SAC's giant bombers in particular. As a kind of slap in the face it picked VA-55, with its lumbering piston-engine Skyraiders, to intercept SAC's monster Convair B-36 bombers inbound from Hawaii as they neared California at 9755 to 10365 m (32,000 to 34,000 ft). VA-55 staggered up to meet the bombers, took photos and sent them to the US Air Force!

The same unit's first 'for real' strike came on the eve of Independence Day 1950, and the target was Pyongyang airfield. For the first time those on the ground were awed by the menacing rumble of the great R-3350 Cyclone engines as Lieutenant Commander N.D. Hodson's dozen ADs let go their loads (two 227-kg/500-lb and six 45-kg/100-lb bombs each) with every bomb carefully aimed. A day later, on 4 July itself, VA-55 severed a bridge span and claimed 10 locomotives. The war was on.

By October 1950 the *Valley Forge* had been joined in Task Force 77 by two other carriers, the USS *Philippine Sea* and the USS *Leyte*. They spent the winter, and much of the following three years, hitting targets all over Korea, and in particular communications links such as rail yards, bridges and tunnels. Millions of rounds of '20 mike mike' ammo were fired, and hundreds of thousands of bombs dropped in sizes up to 907 kg (2,000 lb), along with shiploads of HVARs (high-velocity aircraft rockets). Many of the US Navy outfits were designated as VFs (fighter squadrons), who were not at all unhappy at getting an attack aircraft, and three of the busiest were US Marine Corps units: VMA-121, VMA-251 and the specially equipped VMC-1 which flew the AD-4Q on what a later generation calls Elint (electronic intelligence) missions.

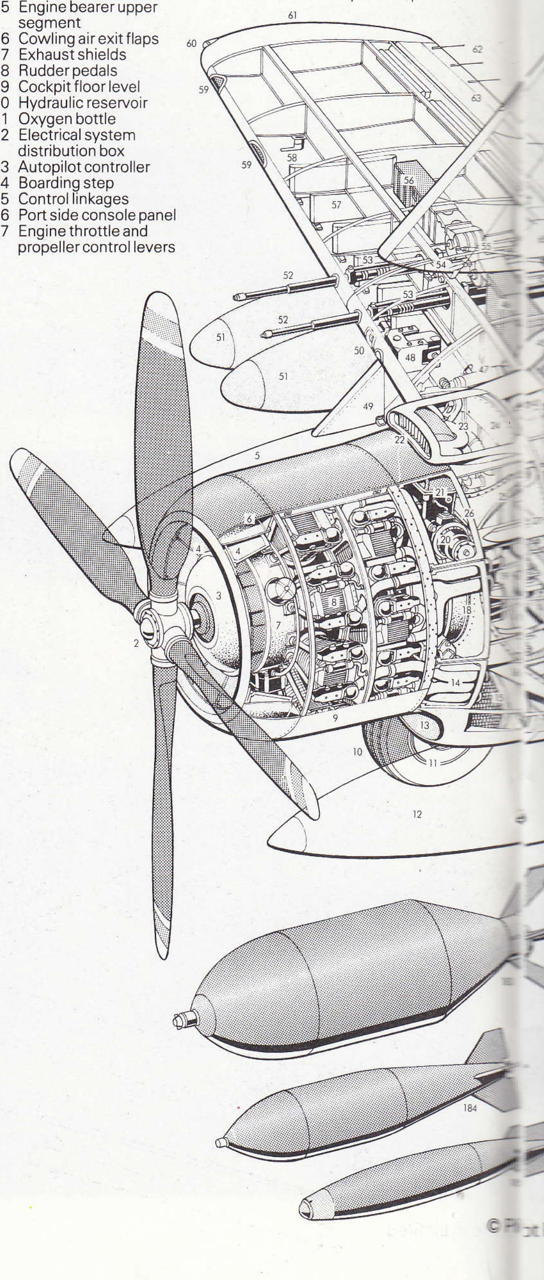
Results were tremendous, but attrition was high. A young aviator, Hank Suerstedt (later an admiral) risked his career by circumventing 'the system' and getting eight rail boxcars of precious aluminium delivered to Douglas. The company called him and asked what it was for. 'Armor plate' was Suerstedt's reply. Tests were done at Patuxent River, Dahlgren and Quonset Point to find the best arrangement, and when the Skyraiders thundered into action for the 1952 season they were well protected by large plates of aluminium 12.7 mm (0.5 in) thick, in some places with an extra skin of steel on the inside. A key role in this was played by a major in the US Marines, Ken Reusser (pronounced 'ricer' and known as Rice-Paddy Reusser because he had been shot down so often). He was also the moving spirit behind the switch from two to four wing cannon, introduced on the AD-4B. With this powerful forward-firing armament the AD was no mean fighter, and if it could catch another aircraft that target was as good as dead because nothing could out-turn a well-flown AD.

By late 1952 the achievements of the Skyraider were already legendary. On many occasions heavy ordnance was put down within 68 m (75 yards) of friendly troops, with never a

An AD-4 Skyraider leaves the deck fully loaded with 454-kg (1,000-lb) and 227-kg (500-lb) bombs for a mission against Communist targets in Korea. The Skyraider played a large part in this campaign.

Douglas A-1H (AD-6) Skyraider cutaway drawing key

1 Aeroproducts four-bladed variable pitch propeller, 13 ft 6 in (4.1 m) diameter
2 Propeller hub pitch change mechanism
3 Gearbox cowling
4 Retractable cooling air baffles
5 Starboard underwing fuel tank
6 Cowling nose ring
7 Propeller reduction gearbox
8 Wright R3350-26WA 18-cylinder, two-row radial engine
9 Detachable cowling panels
10 Starboard mainwheel
11 Mainwheel disc brake
12 Centreline auxiliary fuel tank, capacity 300 US gal (1136 litres)
13 Oil cooler intake
14 Exhaust stubs
15 Oil cooler
16 Engine bearer lower segment
17 Oil tank, capacity 38.5 US gal (146 litres)
18 Engine mounting ring
19 Engine accessory equipment
20 Port magneto
21 Carburettor
22 Carburettor air intake
23 Cockpit air ducting
24 Armoured front bulkhead
25 Engine bearer upper segment
26 Cowling air exit flaps
27 Exhaust shields
28 Rudder pedals
29 Cockpit floor level
30 Hydraulic reservoir
31 Oxygen bottle
32 Electrical system distribution box
33 Autopilot controller
34 Boarding step
35 Control linkages
36 Port side console panel
37 Engine throttle and propeller control levers
38 Control column
39 Circuit breaker panel
40 Instrument panel
41 Windscreen de-misting air duct
42 Instrument panel shroud
43 Reflector gunsight
44 Armoured glass windscreen
45 Starboard mainwheel, retracted position
46 Ammunition tank, 200 rounds
47 Main undercarriage retraction jack
48 Gun camera
49 Starboard inboard pylon
50 Approach light
51 BLU-11B, 500-lb (227-kg) napalm tanks
52 Cannon barrels
53 M3 20-mm cannon
54 Front spar hinge joint
55 Ammunition feed drums
56 Outboard ammunition tank, 200-rounds
57 Starboard outer underwing pylons (six)
58 Ventral pitot tube
59 Radar warning antennae
60 Starboard navigation light
61 Wing tip fairing
62 Static dischargers
63 Starboard aileron
64 Starboard wing, folded position
65 Cannon bay access panels



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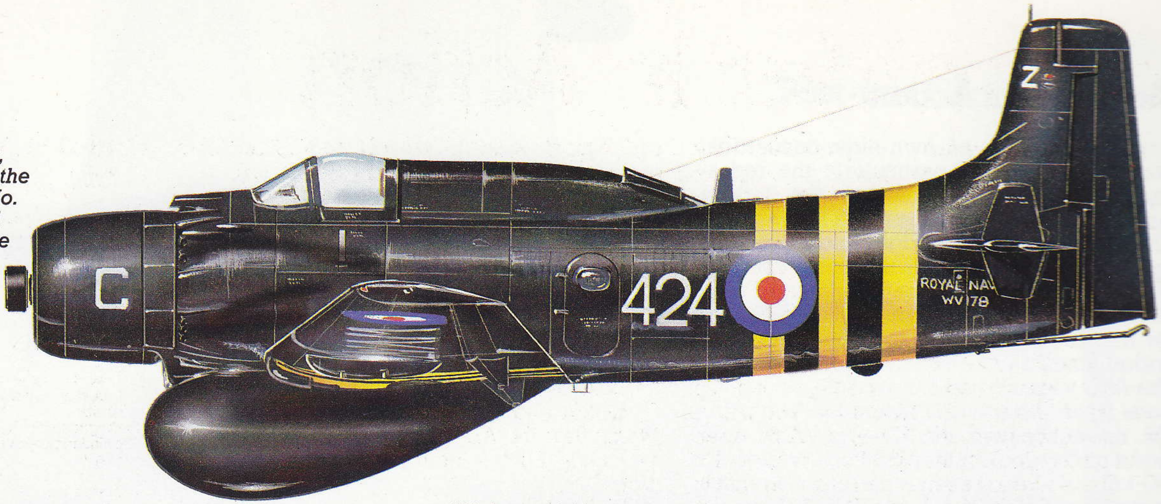
Built as an AD-4W for the US Navy, this Skyraider was transferred to the Fleet Air Arm to become part of No. 849 Sqn. This squadron provided airborne early warning during the Suez campaign, hence the yellow and black stripes.



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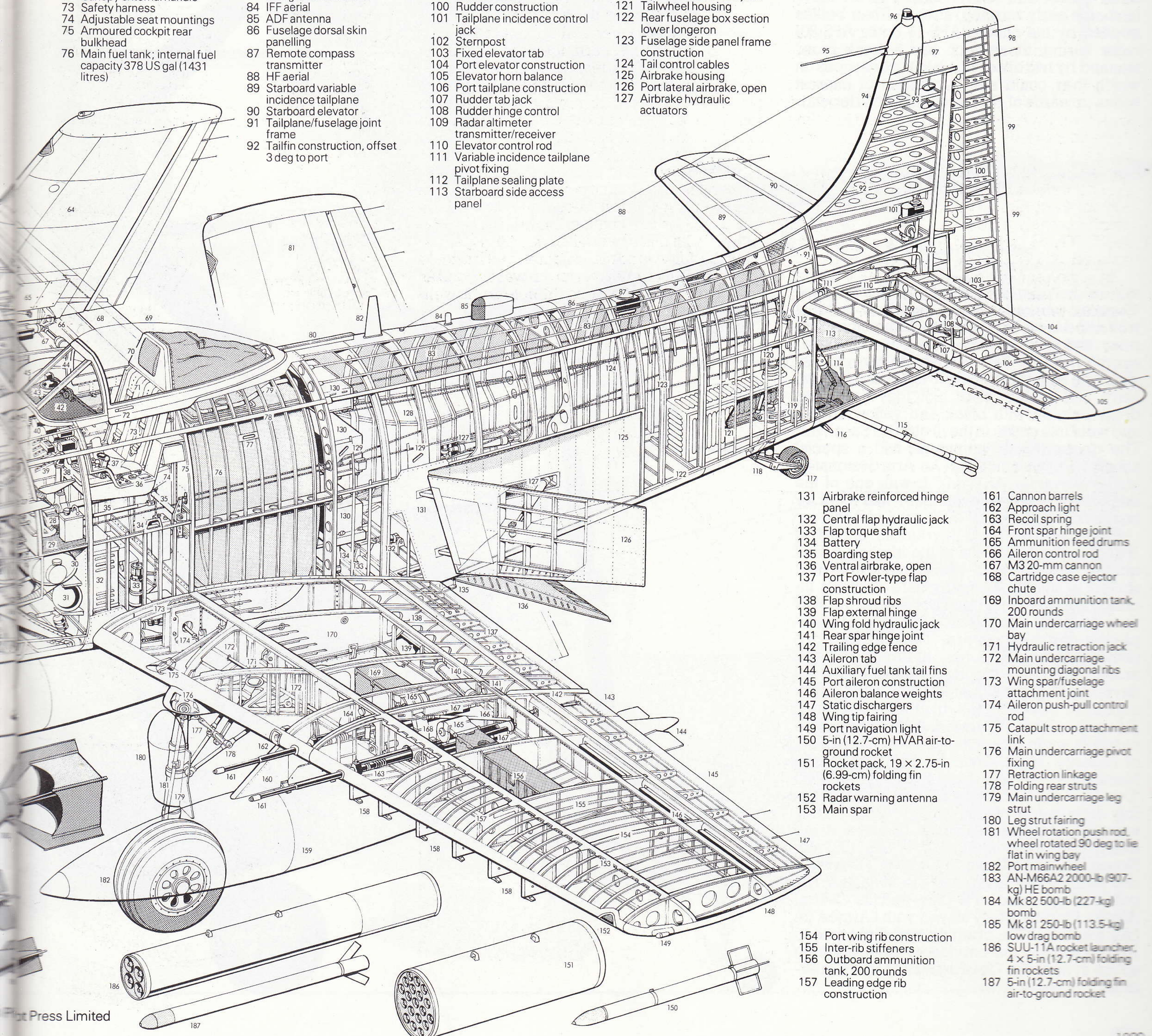
66 Rear spar hinge joint
67 Wing fold hydraulic jack
68 Starboard Fowler-type flap
69 Sliding cockpit canopy cover
70 Armoured headrest
71 Pilot's seat
72 Canopy external handle
73 Safety harness
74 Adjustable seat mountings
75 Armoured cockpit rear bulkhead
76 Main fuel tank; internal fuel capacity 378 US gal (1431 litres)
77 Handgrip
78 Fuselage top longeron
79 Fuel vent pipe
80 Sliding canopy rail
81 Port wing, folded position
82 VHF aerial
83 Dorsal section frame and stringer construction
84 IFF aerial
85 ADF antenna
86 Fuselage dorsal skin panelling
87 Remote compass transmitter
88 HF aerial
89 Starboard variable incidence tailplane
90 Starboard elevator
91 Tailplane/fuselage joint frame
92 Tailfin construction, offset 3 deg to port
93 Tail navigation and formation lights
94 Fin leading edge
95 Static head
96 Anti-collision light
97 Rudder horn balance
98 Static dischargers
99 Rudder tabs
100 Rudder construction
101 Tailplane incidence control jack
102 Sternpost
103 Fixed elevator tab
104 Port elevator construction
105 Elevator horn balance
106 Port tailplane construction
107 Rudder tab jack
108 Rudder hinge control
109 Radar altimeter transmitter/receiver
110 Elevator control rod
111 Variable incidence tailplane pivot fixing
112 Tailplane sealing plate
113 Starboard side access panel
114 Arrestor hook jack/damper
115 Deck arresting hook, down position
116 Catapult hold-back link
117 Tailwheel solid tyre
118 Castoring tailwheel forks
119 Tailwheel pivot fixing
120 Hydraulic retraction jack
121 Tailwheel housing
122 Rear fuselage box section lower longeron
123 Fuselage side panel frame construction
124 Tail control cables
125 Airbrake housing
126 Port lateral airbrake, open
127 Airbrake hydraulic actuators
128 Starboard lateral airbrake housing
129 Handgrips
130 Radio and electronics equipment racks
158 Port outboard wing pylons (six)
159 Auxiliary fuel tank, capacity 300 US gal (1136 litres)
160 Inboard pylon



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131 Airbrake reinforced hinge panel
132 Central flap hydraulic jack
133 Flap torque shaft
134 Battery
135 Boarding step
136 Ventral airbrake, open
137 Port Fowler-type flap construction
138 Flap shroud ribs
139 Flap external hinge
140 Wing fold hydraulic jack
141 Rear spar hinge joint
142 Trailing edge fence
143 Aileron tab
144 Auxiliary fuel tank tail fins
145 Port aileron construction
146 Aileron balance weights
147 Static dischargers
148 Wing tip fairing
149 Port navigation light
150 5-in (12.7-cm) HVAR air-to-ground rocket
151 Rocket pack, 19 × 2.75-in (6.99-cm) folding fin rockets
152 Radar warning antenna
153 Main spar
154 Port wing rib construction
155 Inter-rib stiffeners
156 Outboard ammunition tank, 200 rounds
157 Leading edge rib construction
161 Cannon barrels
162 Approach light
163 Recoil spring
164 Front spar hinge joint
165 Ammunition feed drums
166 Aileron control rod
167 M3 20-mm cannon
168 Cartridge case ejector chute
169 Inboard ammunition tank, 200 rounds
170 Main undercarriage wheel bay
171 Hydraulic retraction jack
172 Main undercarriage mounting diagonal ribs
173 Wing spar/fuselage attachment joint
174 Aileron push-pull control rod
175 Catapult strop attachment link
176 Main undercarriage pivot fixing
177 Retraction linkage
178 Folding rear struts
179 Main undercarriage leg strut
180 Leg strut fairing
181 Wheel rotation push rod, wheel rotated 90 deg to lie flat in wing bay
182 Port mainwheel
183 AN-M66A2 2000-lb (907-kg) HE bomb
184 Mk 82 500-lb (227-kg) bomb
185 Mk 81 250-lb (113.5-kg) low drag bomb
186 SUU-11A rocket launcher, 4 × 5-in (12.7-cm) folding fin rockets
187 5-in (12.7-cm) folding fin air-to-ground rocket

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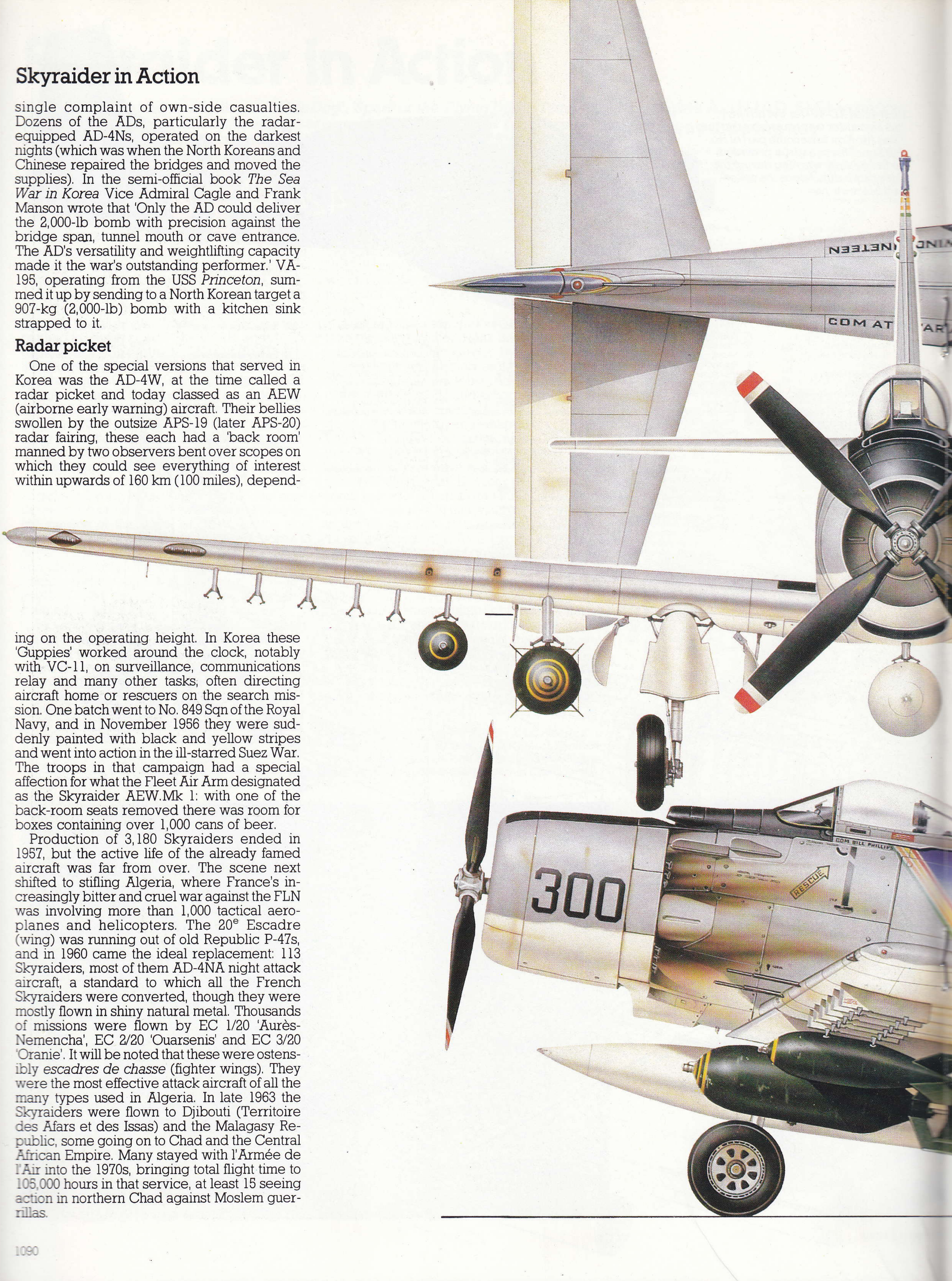
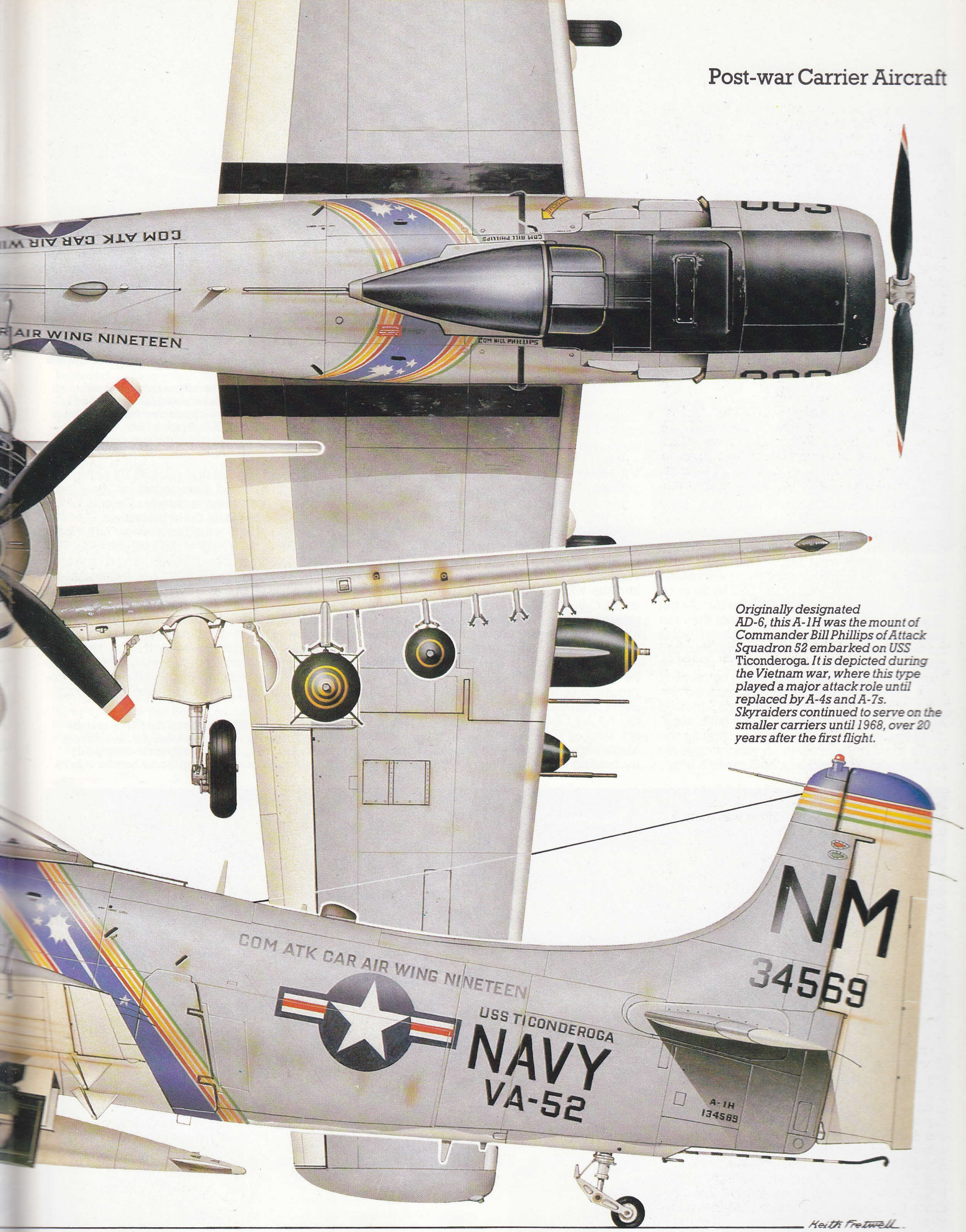
single complaint of own-side casualties. Dozens of the ADs, particularly the radar-equipped AD-4Ns, operated on the darkest nights (which was when the North Koreans and Chinese repaired the bridges and moved the supplies). In the semi-official book *The Sea War in Korea* Vice Admiral Cagle and Frank Manson wrote that 'Only the AD could deliver the 2,000-lb bomb with precision against the bridge span, tunnel mouth or cave entrance. The AD's versatility and weightlifting capacity made it the war's outstanding performer.' VA-195, operating from the USS *Princeton*, summed it up by sending to a North Korean target a 907-kg (2,000-lb) bomb with a kitchen sink strapped to it.

Radar picket

One of the special versions that served in Korea was the AD-4W, at the time called a radar picket and today classed as an AEW (airborne early warning) aircraft. Their bellies swollen by the outsize APS-19 (later APS-20) radar fairing, these each had a 'back room' manned by two observers bent over scopes on which they could see everything of interest within upwards of 160 km (100 miles), depending on the operating height. In Korea these 'Guppies' worked around the clock, notably with VC-11, on surveillance, communications relay and many other tasks, often directing aircraft home or rescuers on the search mission. One batch went to No. 849 Sqn of the Royal Navy, and in November 1956 they were suddenly painted with black and yellow stripes and went into action in the ill-starred Suez War. The troops in that campaign had a special affection for what the Fleet Air Arm designated as the Skyraider AEW.Mk 1: with one of the back-room seats removed there was room for boxes containing over 1,000 cans of beer.

Production of 3,180 Skyraiders ended in 1957, but the active life of the already famed aircraft was far from over. The scene next shifted to stifling Algeria, where France's increasingly bitter and cruel war against the FLN was involving more than 1,000 tactical aeroplanes and helicopters. The 20^{e} Escadre (wing) was running out of old Republic P-47s, and in 1960 came the ideal replacement: 113 Skyraiders, most of them AD-4NA night attack aircraft, a standard to which all the French Skyraiders were converted, though they were mostly flown in shiny natural metal. Thousands of missions were flown by EC 1/20 'Aurès-Nemencha', EC 2/20 'Ouarsenis' and EC 3/20 'Oranie'. It will be noted that these were ostensibly *escadres de chasse* (fighter wings). They were the most effective attack aircraft of all the many types used in Algeria. In late 1963 the Skyraiders were flown to Djibouti (Territoire des Afars et des Issas) and the Malagasy Republic, some going on to Chad and the Central African Empire. Many stayed with l'Armée de l'Air into the 1970s, bringing total flight time to 105,000 hours in that service, at least 15 seeing action in northern Chad against Moslem guerrillas.

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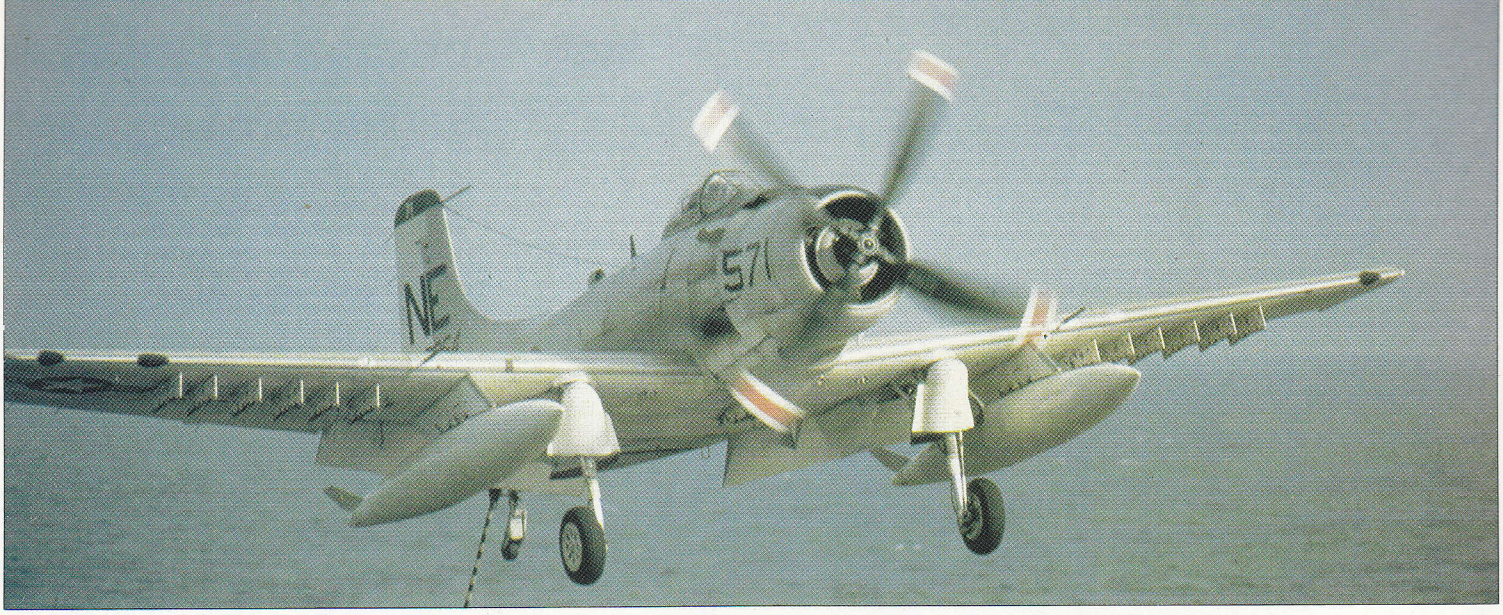
Keith Fretwell

Originally designated AD-6, this A-1H was the mount of Commander Bill Phillips of Attack Squadron 52 embarked on USS Ticonderoga. *It is depicted during the Vietnam war, where this type played a major attack role until replaced by A-4s and A-7s. Skyraiders continued to serve on the smaller carriers until 1968, over 20 years after the first flight.*



A Douglas A-1 comes over the ramp with all ordnance gone and hook down, showing the 14 underwing pylons which enabled the Skyraider to lift up to 3629-kg (8,000-lb) of stores.

In 1965 ten of the French AD-4NAs (by this time called A-1Ds) were given to Cambodia, followed by five more later. They were among the first aircraft to go into action against the Viet Cong, but there were many others. The very first US aircraft in South Vietnam were the 25 Skyraiders, one instructor pilot and six enlisted men of ATU (Aviation Training Unit) 301 in early 1960. Their mission was to train South Vietnamese, but Stateside Skyraiders were to have more impact. As early as 20 July 1965, the piston-engine Skyraider was to begin knocking down swept-wing MiGs. Four A-1H (previously AD-6) single-seaters were scrambled by VA-25 from the deck of the USS *Midway* on Rescap (rescue combat air patrol). About 72 km (45 miles) south west of Hanoi they ran into two shiny MiG-17s. The Skyraiders (by this time universally known as Sandy, the Spad and also as The Flying Dump Truck) dived to ground level in a valley with sharp outcrops of karst limestone all around. One 'pickled' his drop tanks at the very instant a MiG blasted away with his heavy cannon; as the tanks separated the Spad jumped up high enough for the shells to pass underneath. A violent dogfight ensued, and suddenly as a MiG made a head-on attack it came into the sights of two other Spads. One fired 90 rounds, the other 50; they struck the cockpit and the MiG, after passing straight between the two A-1s, barely a wing-span apart, went straight into the karst ridge. About 18 months later young Tom Patton of VA-176 from the USS *Intrepid* bagged another MiG. No MiG ever shot down a Skyraider.

In Vietnam Sandys and Spads served not only with the US Navy and US Marines but also with the US Air Force and the VNAF (South Vietnam air force). By 1967 only the last two were still flying the A-1 in this conflict, the chief versions being the single-seat A-1H and A-1J and the wide-body A-1E with a side-by-side cockpit. Both could carry a vast assortment of stores on 15 external pylons, including not only all manner of ordnance but specialized loads such as giant canisters of Spikebuoy or Acoubuoy sensors in the 'Igloo White' system for detecting tiny ground tremors signalling presence of targets. USAF Tactical Air Command used the A-1 in both H and J versions in the 1st Air Commando Group engaged in every kind of COIN, FAC and rescue mission. Major Bernie F. Fisher won the Medal of Honor by landing on the A Shau airstrip, which was littered with debris and pocked by bomb and mortar craters and surrounded by Viet Cong, to rescue a stricken comrade. He was being fired on point-blank the whole time.

Several Spad squadrons were still operational with the VNAF at the final collapse. The USAF continued flying the well-loved type until October 1974. The US Navy had pensioned off its last Spad in 1968, and VA-25 (which had done so many great things in the type) gave the old bird a fitting send-off at NAS Lemoore, California. In a most moving invocation the chaplain said 'The horizon will be more empty as the familiar profile fades from view. But the deeds of men and this plane will remain on the pages of history a source of hope and courage.'

As well as the US Navy, the US Air Force and the Vietnamese Air Force also used the Skyraider in South East Asia, mainly for counter-insurgency missions, often using phosphorus bombs as here.

USA

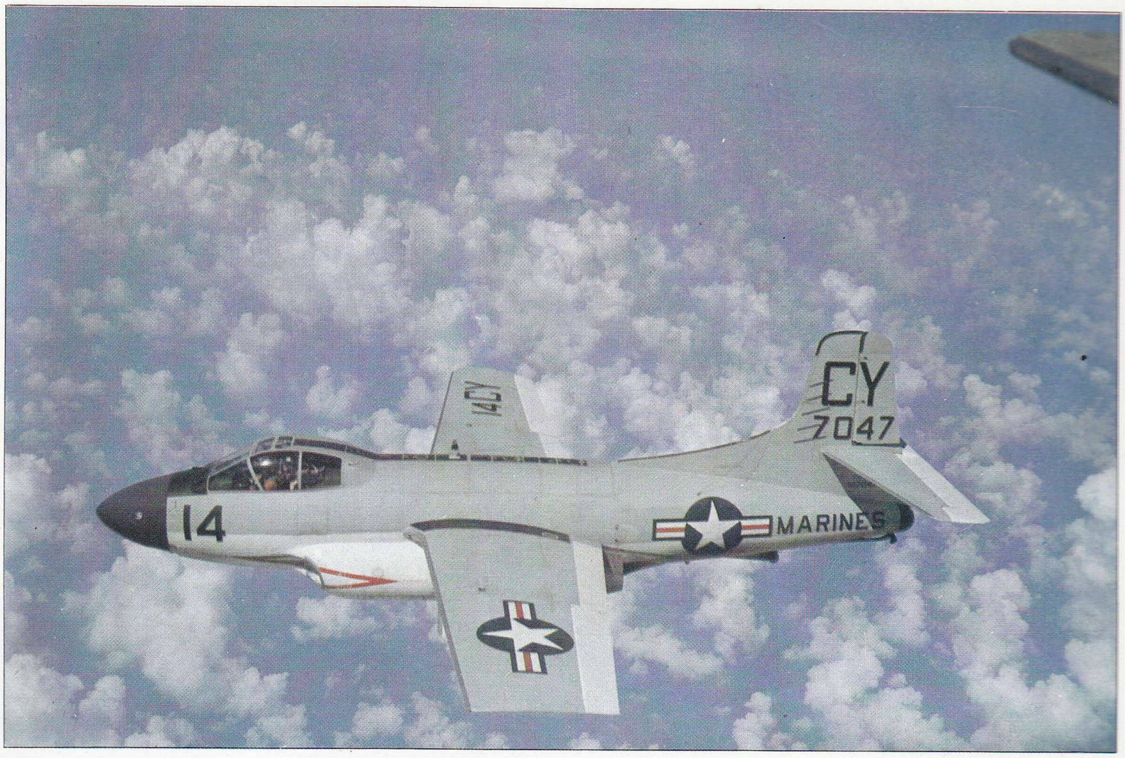
Douglas F3D Skyknight

Although produced in only fairly limited numbers, the **Douglas F3D Skyknight** enjoyed a lengthy career by the standards of the day, remaining in front-line service with the US Marine Corps as an electronic countermeasures platform until 1969. During the course of its 18-year career the Skyknight also undertook combat duty in both the Korean and Vietnamese conflicts, and it is probably not widely known that the Skyknight secured a permanent niche in aviation history when, on the night of 2 November 1952, it succeeded in downing a North Korean Yakovlev Yak-15, this marking the first recorded kill in a jet-versus-jet combat at night. Even more remarkable is the fact that the F3D ended the Korean War as the most successful naval fighter type in terms of aircraft destroyed in air combat. Today, despite its age, two examples of the Skyknight still provide valuable service to the US armed forces, these being used by the US Army in support of air defence missile testing at White Sands, New Mexico.

Unique in being the US Navy's first jet-powered night-fighter, the Skyknight began development in 1945, Douglas being awarded a contract for three **XF3D-1** prototypes in April 1946, and the first of these made its maiden flight from Muroc (now Edwards AFB) on 23 March 1948, this event being followed in June by an order for 28 production **F3D-1** (later redesignated **F-10A**) fighters. Service acceptance trials were conducted by VC-3 at Moffett Field from December 1950, the type then being handed over to Marine Night Fighter Squadron VMF(N)-542. In the event, the F3D-1 did not see action, being quickly supplanted by the upengined **F3D-2 (F-10B)**, 237 of which were completed in the early 1950s. It was this model which made the Skyknight's combat debut with VMF(N)-513 in June 1952.

In US Navy service, the F3D enjoyed only a brief front-line career, being quickly relegated to radar intercept training duties as the **F3D-2T** and **F3D-2T2 (TF-10B)**, the last example being retired in the early 1960s. US Marine Corps composite squadrons continued to use the **F3D-2Q (EF-10B)** type in ECM duties, however, and the type again saw action in Vietnam with VMCJ-1 until 1969 when it was finally replaced by the Grumman EA-6A Intruder.

A proposed swept-wing version known as the **F3D-3** was cancelled in 1952, but other service variants were the missile-armed **F3D-1M** and **F3D-2M (MF-10B)**.



The most successful naval type in air-to-air combat over Korea, the Douglas F3D Skyknight was flown by both Marines and Navy. This example is a Marines F3D-2. These continued in service until 1969 in the electronic counter-measures role.

Specification
Douglas F3D-2 Skyknight

Type: carrierborne night and all-weather fighter
Powerplant: two 1542-kg (3,400-lb) thrust Westinghouse J34-WE-36 turbojets
Performance: maximum speed 909 km/h (565 mph) at 6095 m (20,000 ft); service ceiling 11645 m (38,200 ft); range 2478 km (1,540 miles)
Weights: empty 8237 kg (18,160 lb); maximum take-off 12556 kg (27,681 lb)
Dimensions: span 15.24 m (50 ft 0 in); length 13.84 m (45 ft 5 in); height 4.90 m (16 ft 1 in); wing area 37.16 m^2 (400 sq ft)
Armament: four 20-mm cannon, plus provision for two 907-kg (2,000-lb) bombs

USA

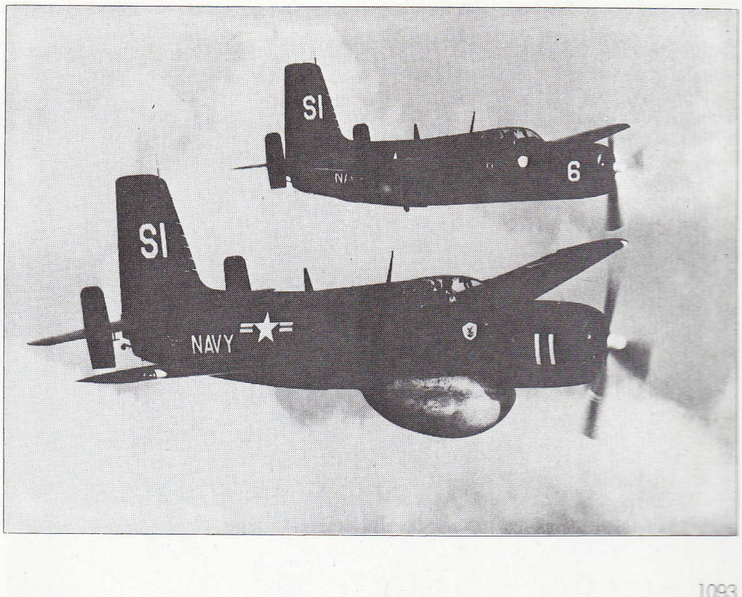
Grumman AF-2 Guardian

In 1944 Grumman set out to produce a successor to the war-winning TBF Avenger torpedo bomber, and the first result was the **XTBF-1**, first flown on 19 December 1945. Looking like a slimmer and neater TBF, this machine had a Westinghouse J30 (later an Allis-Chalmers J36, otherwise de Havilland Goblin) turbojet in the tail for high-speed boost propulsion. This was later omitted, and at last the first **Grumman AF-2 Guardian** flew in November 1949. It was put into production in two versions, which operated from US Navy carriers in the ASW (anti-submarine warfare) role in pairs, known as hunter/killers. The hunter was the **AF-2W**, distinguished by its big 'guppy' APS-20A search radar, the displays and controls for which were in a two-seat rear compartment as in radar-equipped Skyraiders. The killer was the **AF-2S**, which took over when its companion had obtained a sure 'contact'. First it used its smaller APS-30 radar under the right outer wing to pinpoint its target, using a searchlight in an identical pod under the left wing to illuminate it if necessary. Then it would attack using any of its assortment of weapons. The Guardians were among the largest single-engine military aircraft, heavier than a Douglas DC-3 and with a roomy side-by-side cockpit, the AF-2S having a third rear-compartment seat for the single radar operator. Grumman delivered 193 of the AF-2S attack version and 153 of its companion AF-2W model in 1950-3. The company then followed with 40 **AF-3S** machines, which were the first aircraft in service with MAD (magnetic-anomaly detection) gear in a retractable tail-boom mounting.

Specification
Grumman AF-2S Guardian

Type: three-seat carrier-based ASW and attack aircraft
Powerplant: one 2,400-hp (1790-kW) Pratt & Whitney R-2800-48W 18-cylinder radial piston engine
Performance: maximum speed 510 km/h (317 mph) at medium/high altitude; service ceiling 9910 m (32,500 ft); range 2415 km (1,500 miles)
Weights: empty 6632 kg (14,620 lb); maximum take-off 11567 kg (25,500 lb)
Dimensions: span 18.49 m (60 ft 8 in); length 13.21 m (43 ft 4 in); height 4.93 m (16 ft 2 in); wing area 52 m^2 (560.0 sq ft)
Armament: internal bay for 1814 kg (4,000 lb) o torpedoes, bombs, depth charges, mines or other stores, with additional wing racks for similar weapons

The Grumman Guardian was designed to carry out its anti-submarine role in pairs, with a 'hunter-killer' arrangement. The nearest aircraft, an AF-2W, carries powerful search radar whilst the further aircraft, an AF-2S, carries the stores to dispatch any submarines.



USA

Grumman F7F Tigercat

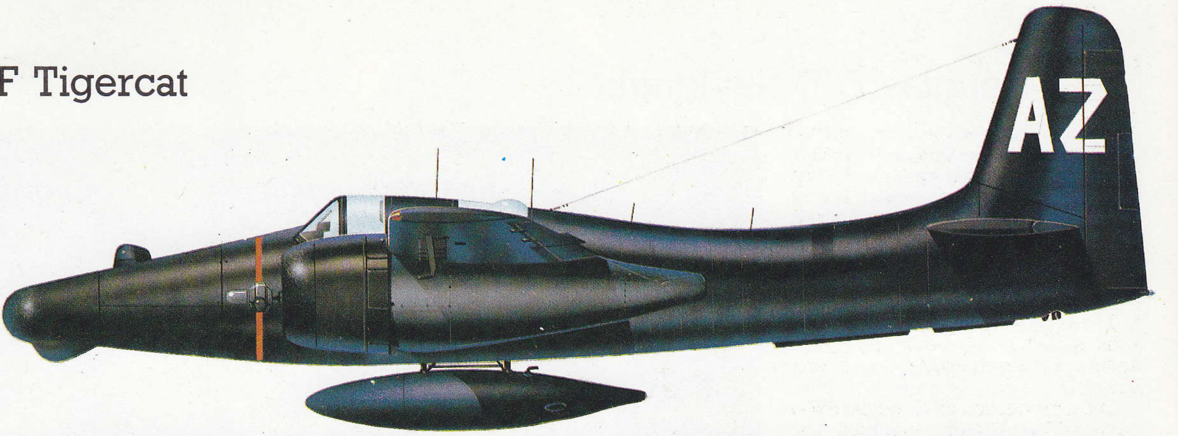
Aesthetically perhaps the most pleasing of Grumman's World War II designs, the **Grumman F7F Tigercat** was intended primarily for service aboard the 45,000-ton 'Midway' class aircraft-carriers, although in the event it was mainly employed by the US Marine Corps as a land-based fighter, largely as a result of its weight and size. Unique in being the first fighter with tricycle landing gear to be accepted for US Navy service, the Tigercat suffered badly from post VJ-Day cancellations, production terminating with the delivery of the 364th example.

Based on experience gained with the earlier and unsuccessful XF5F Skyrocket design, the initial contract awarded to Grumman in June 1941 covered the construction of two **XF7F-1** prototypes, both of which flew from Bethpage, Long Island, during November 1943. Subsequent testing revealed considerable promise and the type was ordered into production as the **F7F-1**, deliveries to the US Marine Corps getting under way during April 1944 when VMF-911 became the first squadron to receive the Tigercat.

By this time it had been decided to use the type mainly as a night-fighter, and this policy decision quickly led to the appearance of the **F7F-2N**, a fuel tank being removed to provide room for a radar operator. In addition, the four nose-mounted machine-guns were also deleted in favour of radar but the F7F-2N was still heavily armed, possessing four 20-mm cannon buried in the wing leading edges. A total of 45 F7F-2Ns was built.

The next version to appear was the **F7F-3**, and this was without a doubt the best-performing Tigercat. Some 189 were built, a few being fitted with cameras for reconnaissance as the **F7F-3P**, whilst 60 two-seat **F6F-3N** night-fighters were also completed before production came to a close in November 1946 with 13 **F7F-4N** aircraft featuring an enlarged vertical tail, improved radar and other refinements.

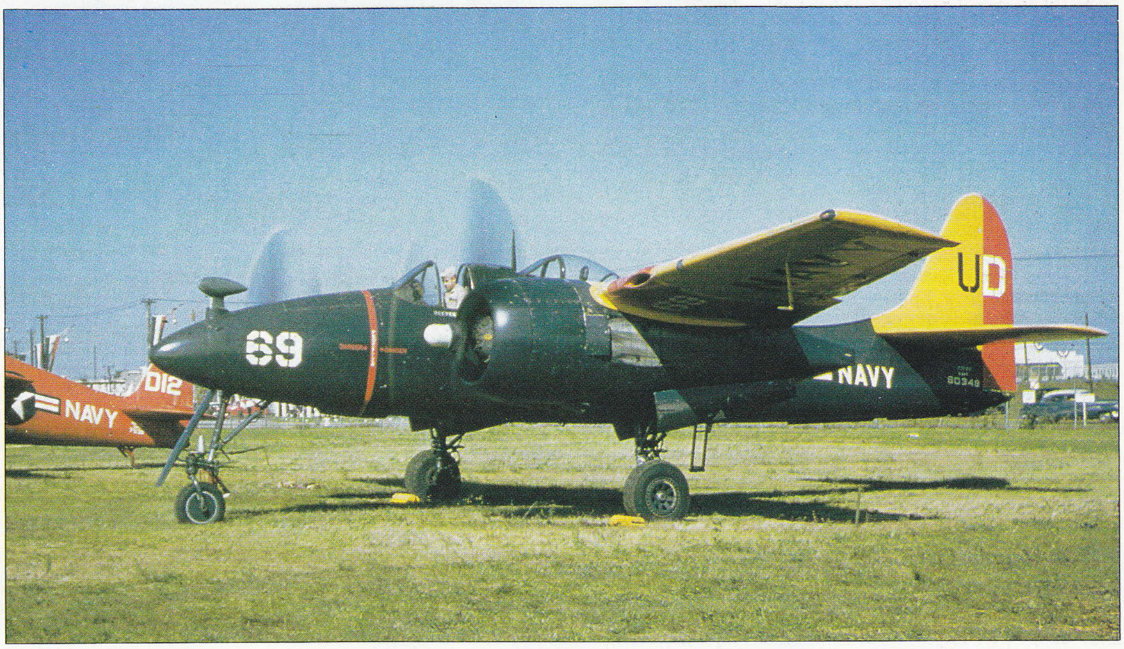
Although too late for World War II, the Tigercat did see action in Korea, VMF(N)-542's F7F-3Ns entering combat in October 1950 and performing well by both day and night in the interdiction task.



Used in small numbers during the Korean campaign, the Grumman F7F-3N night fighter proved to be an extremely effective aircraft. This aircraft served with a Marines Headquarters flight.

Specification

Grumman F7F-3 Tigercat
Type: carrierborne fighter
Powerplant: two 2,100-hp (1566-kW) Pratt & Whitney R-2800-34W radial piston engines
Performance: maximum speed 700 km/h (435 mph) at 6705 m (22,000 ft); service ceiling 12405 m (40,700 ft); range 1931 km (1,200 miles)
Weights: empty 7380 kg (16,270 lb); maximum take-off 11667 kg (25,720 lb)
Dimensions: span 15.70 m (51 ft 6 in); length 13.83 m (45 ft 4.5 in); height 5.05 m (16 ft 7 in); wing area 42.27 m^2 (455 sq ft)
Armament: four 12.7-mm (0.5-in) machine-guns and four 20-mm cannon



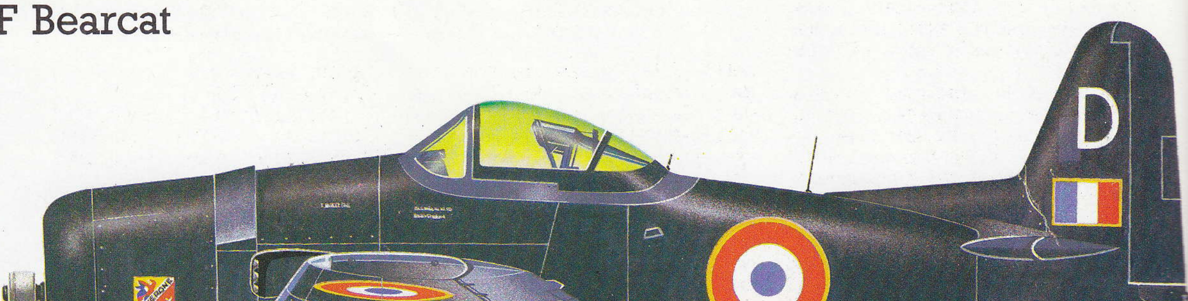
Grumman's Tigercat only ever saw action with the Marine Corps, despite being designed as a carrier fighter. Several aircraft were handed over to the Navy and converted into drone directors with an extra cockpit for the drone pilot. Drones were mostly F6F Hellcats.

USA

Grumman F8F Bearcat

Conceived as a replacement for the earlier Grumman F6F Hellcat, the **Grumman F8F Bearcat** was also intended to surpass the Japanese Mitsubishi A6M 'Zeke' (itself no mean performer), and later fighters. But although deliveries began before VJ-Day the Bearcat played no part in World War 2, most of the 8,000 or so examples on order being cancelled following the return of peace. Despite being overtaken by events, the Bearcat did see service with the US Navy in substantial numbers, a total of 1,263 eventually being completed for this service, and many of these were later passed on to the air arms of France, Thailand and South Vietnam.

Optimized for interception tasks, which dictated a lightweight airframe possessing a good rate of climb, the Bearcat was probably Grumman's finest propeller-driven fighter, and had the war continued there is little doubt that it would have given a good

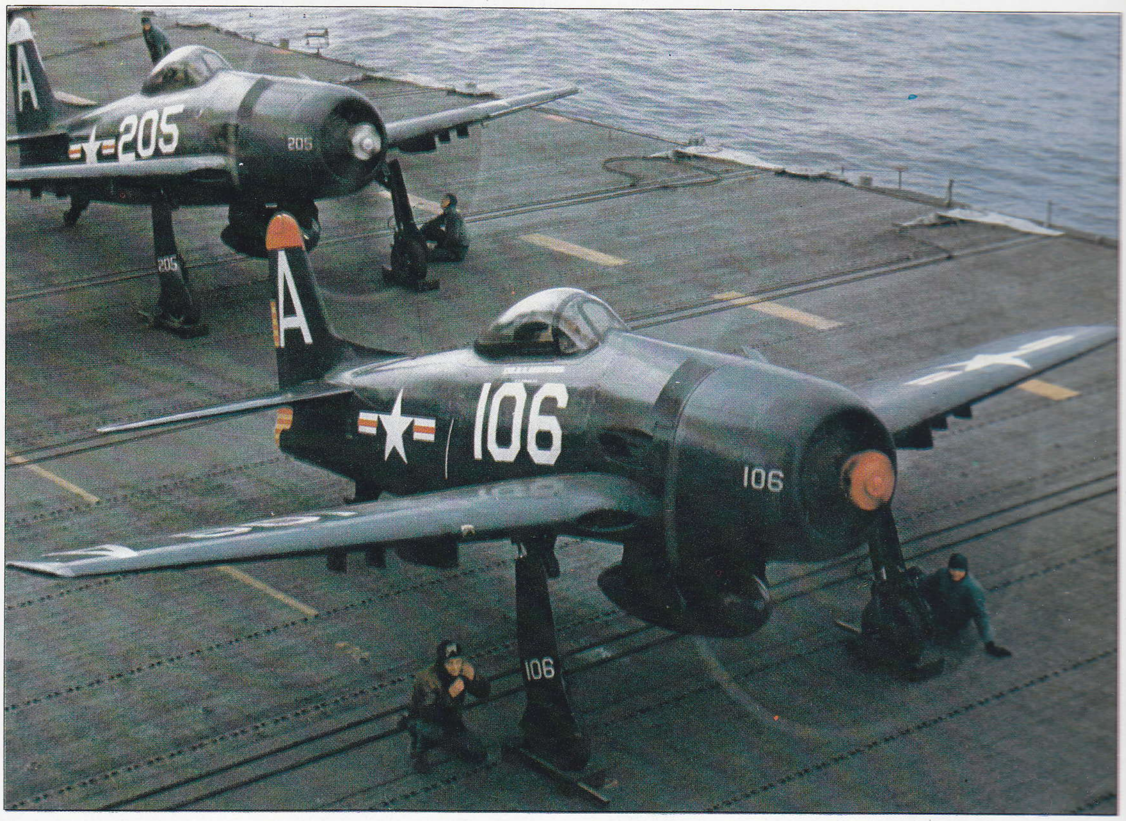


This Grumman F8F-1 was flown by Armée de l'Air squadron GC II/21 from Tan Son Nhut during the Indo-China campaign, where its firepower proved useful to the French, although it was hampered by limited range.

account of itself. Standard production machines were capable of speeds well in excess of 644 km/h (400 mph), whilst the specially modified aircraft flown by stunt pilot Al Williams actually achieved a speed of 805 km/h (500 mph) at 5790 m (19,000 ft). Even more startling, however, was the rate of climb, one F8F-1 reaching 3050 m (10,000 ft) in just 94 seconds from brakes-off during November 1946 and setting a national record in the process.

Initial production involved the **F8F-1** variant, 770 of which were built, and these were followed by 126 **F8F-1B** fighters which had four 20-mm cannon in place of the more usual quartet of 12.7-mm (0.5-in) machine-guns. Refinement of the basic design resulted in the **F8F-2** which had taller vertical tail surfaces and a revised engine cowling, some 365 being completed in the early post-war years before the jet era arrived and revolutionized carrierborne aviation.

In addition to these new-build aircraft, close to 50 Bearcats were later retrofitted with APS-19 radar for nightfighter tasks as the **F8F-1N** and **F8F-2N**, whilst 60 more acquired cameras and became **F8F-2P** photographic reconnaissance aircraft, these having only two cannon installed.



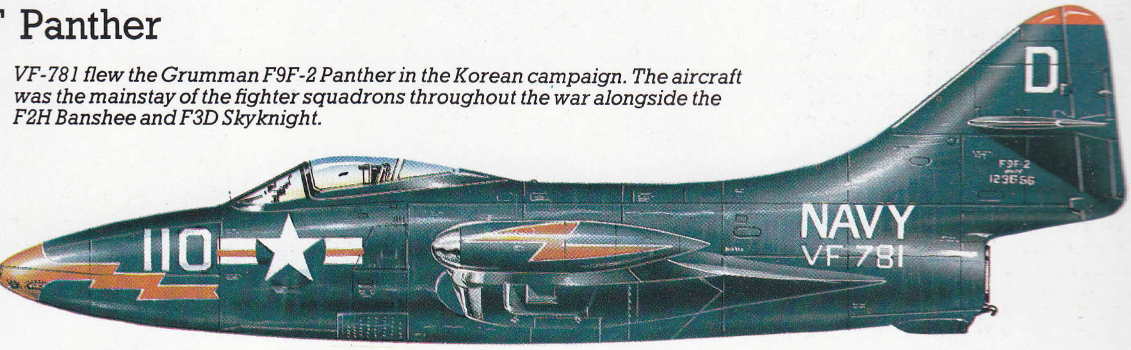
Specification
Grumman F8F-1 Bearcat
Type: carrierborne interceptor fighter
Powerplant: one 2,100-hp (1566-kW) Pratt & Whitney R-2800-34W radial piston engine
Performance: maximum speed 678 km/h (421 mph) at 6005 m (19,700 ft); service ceiling 11795 m (38,700 ft); range 1778 km (1,105 miles)
Weights: empty 3207 kg (7,070 lb); maximum take-off 5873 kg (12,946 lb)
Dimensions: span 10.92 m (35 ft 10 in); length 8.61 m (28 ft 3 in); height 4.22 m (13 ft 10 in); wing area 22.67 m^2 (244 sq ft)
Armament: four 12.7-mm (0.5-in) machine-guns

Grumman F8F-1 Bearcats began replacing the F6F Hellcat as the US Navy's main fighter. Here aircraft from VF-15A and VF-16A prepare for launch from USS Tarawa.

USA

Grumman F9F Panther

VF-781 flew the Grumman F9F-2 Panther in the Korean campaign. The aircraft was the mainstay of the fighter squadrons throughout the war alongside the F2H Banshee and F3D Skyknight.



The first jet-powered 'cat' to be produced by the company, the **Grumman F9F Panther** seems to have lacked the charisma of the earlier F8F Bearcat but nevertheless acquired a well-deserved reputation as a rugged and reliable machine. Historically significant by virtue of the fact that it was the first carrier borne jet to get into combat, the Panther performed well in Korea where it constituted the backbone of US Navy and US Marine Corps air power, and by the time production ceased in late 1952 close to 1,400 had been built.

The initial F9F proposal was for a four-engine two-seat night-fighter, but this was subsequently abandoned before design work was complete, Grumman then turning its attentions to a single-seat single engine jet day fighter, two prototypes duly being ordered with the designation **XF9F-2**. Powered by an imported Rolls-Royce Nene engine, the first of these made its maiden flight on 24 November 1947 and such was the promise shown that substantial orders were soon forthcoming for production-configured **F9F-2** aircraft fitted with the licence-built Pratt & Whitney J42 copy of the Nene turbojet.

Although the F9F-2 was the initial production model, the honour of being the first variant to enter service fell to the **F9F-3**, which used the slightly less powerful Allison J33 engine. This joined US Navy Fighter Squadron VF-51 during May 1949 but in the event only 54 F9F-3s were completed, most being modified later to F9F-2 standard. The next version to appear was the **F9F-4** with the Allison J33-A-16, deliveries of this variant beginning in November 1949, about a month before the maiden flight of what became the most prolific and, incidentally, the last member of the Panther family. This was the **F9F-5** which was powered by the Pratt & Whitney J48, a licence-built Rolls-Royce Tay, and over 600 were completed by the time production ceased at the end of 1952, this total including a small number of **F9F-5P** aircraft for photo reconnaissance duties.

The F9F-5 was the last version to see squadron service, being finally retired by VAH-7 in October 1958, although many Panthers continued to fly after that date with training units, and as **F9F-5KD** (from 1962 **DF-9E**) drone targets and controllers for missile trials.

Specification
Grumman F9F-5 Panther
Type: carrierborne day fighter
Powerplant: one 3175-kg (7,000-lb) thrust Pratt & Whitney J48-P-6 turbojet
Performance: maximum speed 932 km/h (579 mph) at 1525 m (5,000 ft); service ceiling 13380 m (43,900 ft); range 2092 km (1,300 miles)
Weights: empty 4603 kg (10,147 lb); maximum take-off 8492 kg (18,721 lb)
Dimensions: span 11.58 m (38 ft 0 in); length 11.58 m (38 ft 0 in); height 3.73 m (12 ft 3 in); wing area 23.23 m^2 (250 sq ft)
Armament: four 20-mm cannon, plus up to 1361 kg (3,000 lb) of external ordnance

Seen over Korea, this F9F-2 Panther of VF-721 is typical of the Panthers serving in that war. Internal fuel tankage was almost double that of the similarly powered Sea Hawk.

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Naval Aircraft in Korea

In the immediate post-war years, many people saw the attack carrier as an anachronism in the age of the atom bomb. Yet when the Korean war looked lost in its first week, it was the aircraft of USS* Valley Forge*, and later of HMS* Triumph*, that supported the United Nations effort.

The start of the Korean war in June 1950 came just as the forces of the Allies, who had lately won World War II, were at their lowest ebb. Moreover, in the air the trauma of switching from propellers to jets was tending to divide front-line forces into those that were competitive and those that were not, although a few of the seemingly obsolete propeller aircraft, notably the Douglas Skyraider, were to prove effective for almost 20 more years!

A major problem was that while most advanced air forces were polarized around jet-versus-jet combat and strategic missions with nuclear bombs, Korea was an old-fashioned war that called for endless ground attack and close-support missions with traditional ordnance delivered from low level, all backed up by photo-reconnaissance and the new techniques for retrieving downed aircrew by helicopter. Particularly affected were the carrier-based aircraft, which were among the first to get into action and had the advantage of a floating airfield out to sea. These aircraft have to be much more strongly built than all others, to survive the brutal forces of catapult take-off and no-flare arrested landings, barrier crashes and the motions of the ship. They also have to fold up to fit confined spaces.

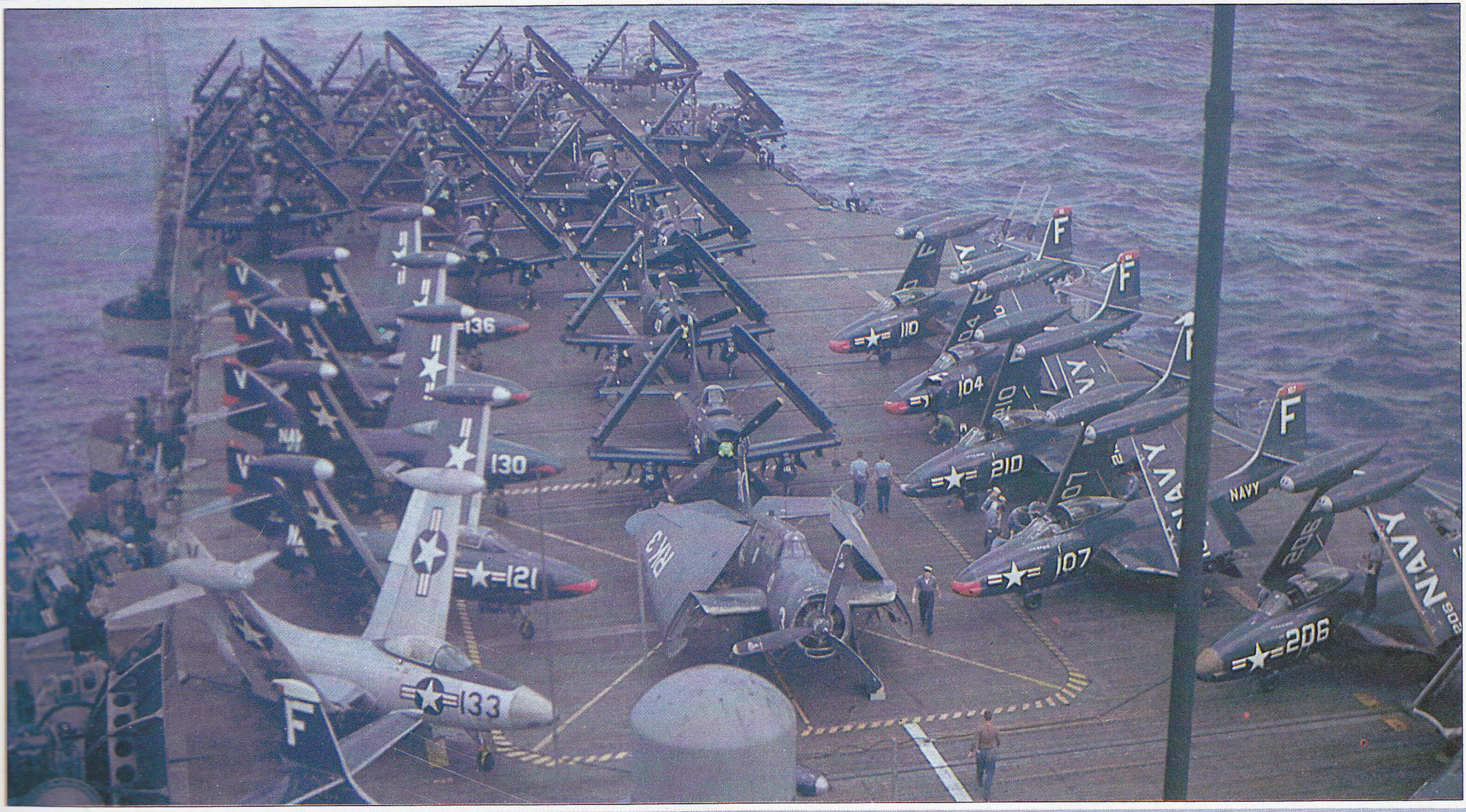
The US Navy and US Marine Corps, and to a later timescale the Royal Navy, were just introducing their first carrier-based jets as the war began. But it was soon recognized that the first-generation jets, which were designed primarily as fighters, were limited in the load of weapons they could carry and even more limited in range and endurance at the low levels of close-support missions. Most of the early naval air support was flown by piston-engined aircraft. First on the scene was the USS *Valley Forge*, which flew its first missions on 3 July 1950, just over a week into the war and as the North Korean hordes were threatening to complete the occupation of South Korea by taking the last vital port of Pusan.

From then onwards the carrier's AD Skyraiders and F4U Corsairs flew round the clock attacking airfields and, subsequently, all forms of surface communications to break the overstretched North Korean supply routes. Two weeks later HMS *Triumph* arrived from Hong Kong and Okinawa. She went straight into action, even though she had spent six months off Malaya while her aircraft rocketed terrorist hideouts. No. 800 Sqn's Supermarine Seafire FR.Mk 47s flew 245 offensive fighter patrols over Korea and 115 ground-attack missions, seeing such hectic action that when the ship withdrew to Hong Kong in September only one Seafire was fully serviceable. The companion outfit was No. 827 Sqn, flying the Fairey Firefly Mk 5s. Carrying 907 kg (2,000 lb) of bombs and/or rockets, as well as four 20-mm cannon, Fireflies were flown with great professionalism and gradually increased average daily sorties from 60 to 120. No aircraft worked harder in Korea than the Firefly, which was flown by Nos 810 (HMS *Theseus*), 812 (HMS *Glory*), 817 (HMAS *Sydney*), 820 (*Glory*), 825 (HMS *Ocean*) and 827 (*Triumph*) Sqns. The Royal Navy's attack missions were augmented from 7 December 1950 by the fast and tough Hawker Sea Fury FB.Mk 11, first deployed in that conflict by No. 807 in the *Theseus*. Subsequently Sea Furies, carrying a 907-kg (2,000-lb) load of external stores plus four cannon, flew with Nos 802 (*Ocean*), 801 and 804 (*Glory*) and 805 and 808 (*Sydney*) Sqns. No. 802 Sqn, with the Fireflies of No. 825 Sqn, were awarded the 1952 Boyd Trophy for their intensive work from the *Ocean*, achieving 123 sorties in a single day. Another claim to fame of No. 802 Sqn was Lieutenant P. Carmichael's shooting down of the first Mikoyan-Gurevich MiG-15 bagged by the Royal Navy; later there were two others, both gained by the piston-engined Sea Fury. *Glory*'s Nos 804 and 812 Sqns flew 4,834 combat missions for the loss of only 27 aircraft.

Marines in Pusan

In the early battle to save Pusan the US Marines had moved in with their own Marine Air Group 33, with VMF-214 and VMF-323 flying Vought F4U Corsairs in close support from the baby flat-tops, USS *Badoeng Strait* and USS *Sicily*. Another US Marine outfit, VMF(N)-513, flew night intruder sorties from Japan, using the F4U-5N; by October this unit, 'Flying Nightmares', had moved closer to the war at Wonson, the other US Marine squadrons flying from Kimpo where they were joined by VMF(N)-542 and VMF-312. In autumn 1952 the F4U-5N was replaced by the Douglas F3D Skyknight twin-jet night-fighter, packed with electronics and seating the pilot and radar observer side by side. Forever known as Willy the Whale from its bulging fuselage, the F3D is

An excellent view of a carrier wing during the Korean war shows Grumman F9F-2 Panthers, McDonnell F2H Banshees, Douglas AD Skyraiders (including an AD-4W airborne early warning aircraft) and a Grumman TBF Avenger, used for carrier onboard delivery.



The fevered pitch of carrier operations during the Korean war meant that accidents occurred with regularity. Here a Douglas AD-4 Skyraider burns aboard the attack carrier USS Essex *(CVA-9) following a deck accident. The wooden decks of the 'Essex' class carriers made aircraft fires extremely dangerous, and crash crews were always on station to extinguish them as quickly as possible.*

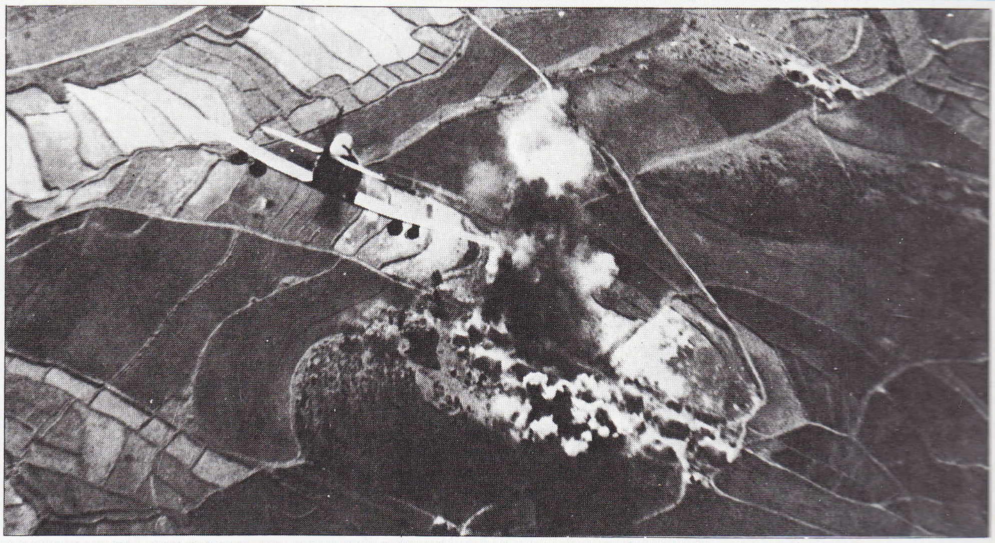
believed to have scored the world's first night jet-versus-jet victory when Major Stratton and Master Sergeant Hoglind crept up on what they thought was a Yakovlev Yak-15 and pumped it full of 20-mm shells. This was the first of many encounters, because the North Koreans and Chinese tended to fly mainly at night. The F3D was credited with more air combat victories than any other US Navy or US Marine aircraft.

This was especially remarkable when it is remembered that day jet victories began two years earlier, on 9 November 1950. In this case the US Navy aircraft was Lieutenant Commander W.T. Amen's Grumman F9F-2, the straight-wing Panther, which had been among the *Valley Forge*'s very first equipment used on the previous 3 July. Various marks of F9F were the leading Allied carrier-based fighters of the entire war, flying over 78,000 combat missions. Indeed, of 826 US Navy and US Marine jets deployed in Korea, no fewer than 733 were F9Fs, including 18 of the new swept-wing Cougars. Grumman also provided a few wartime F7F Tigercats flown by the US Marines on attack missions in 1950, as well as radio-controlled pilotless F6F Hellcats packed with explosives and guided from specially equipped Skyraiders; one destroyed the rail bridge at Hungnam.

If the F9F was numerically the primary US Navy jet, the second was unquestionably the McDonnell F2H Banshee. This very popular machine had the advantage of two engines, Westinghouse J34s, and on countless occasions badly shot-up Banshees recovered to their carrier on one engine. Like the F9F they packed a forward-firing punch with four 20-mm cannon, and a typical bombload was two 227-lb (500-lb) weapons. There was an F2H-2M night-fighter version, but more important over Korea was the long-nosed F2H-2P photo-reconnaissance aircraft which can fairly be described as 'the eyes of the fleet' for most of the Korean war. Indeed Rear Admiral Selden B. Spangler went on record as calling the F2H 'the backbone of the carrier jet aircraft'.

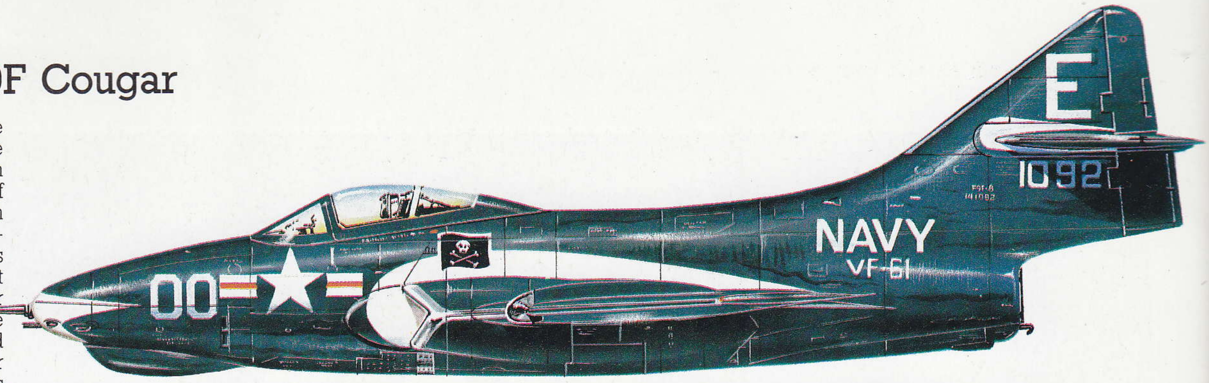
Of course, one should not forget the much larger US Navy aircraft that operated from shore or water bases. By far the most important of the patrol aircraft, the Lockheed P2V Neptune served in several versions of which the most important was the P2V-5, output of which was more than quadrupled until, before the end of the war, the US Navy had received 348. Biggest of all aircraft used for combat missions, apart from the Boeing B-29, were the long-range patrol flying-boats. The US Navy flew the Martin PBM-5A and PBM-5S Mariner from several bases, notably Iwakuni, Japan, while the only RAF aircraft to serve throughout the war was the Short Sunderland GR.Mk 5, with Nos 88, 205 and 209 Sqns, which flew 13,380 hours on monotonous missions covering the entire Korean area.

One of the most used weapons during the Korean war was the unguided rocket. Here a Fleet Air Arm Hawker Sea Fury FB.Mk 11 releases a salvo from its four underwing pods on a Communist strongpoint: a scene typical of many throughout the war.



USA

Grumman F9F Cougar



Grumman's F9F-8 Cougar was distinguished from other marks by the large nose blister and redesigned wing. This example served with VF-61.

First flown in prototype form as the **XF9F-6** on 20 September 1951, the **Grumman F9F Cougar** evolved from the earlier F9F Panther series of fighter aircraft. It differed mainly from its predecessors by virtue of possessing swept wings and tailplane, thus earning the distinction of being the first swept-wing carrierborne type to enter service. Apart from this, changes were kept to a minimum to facilitate rapid production. Indeed, the new Cougar entered service just 14 months after its maiden flight took place, initial examples of the Pratt & Whitney J48-engined **F9F-6** (later designated **F-9F**) joining VF-32 of the Atlantic Fleet naval air force during November 1951. Shortly after this deliveries to Pacific Fleet units got under way, and the type was very soon introduced to combat in Korea.

Production of the F9F-6 totalled 706 aircraft, 60 of which were completed as **F9F-6P** machines for reconnaissance duties, and these were followed by the **F9F-7 (F-9H)** which was powered by an Allison J33 turbojet. This proved to be only a temporary change, and after completing 168 F9F-7s Grumman reverted to the Pratt & Whitney J48 engine for the **F9F-8 (F-9J)**, which became the definitive Cougar, well over 1,000 being completed in three basic variants. First to appear was the F9F-8 (601 built) which possessed increased fuel capacity and also introduced a modified 'saw-tooth' leading edge to the wing; and large numbers were later modified to **F9F-8B (AF-9J)** standard with provision for air-to-surface guided missiles. Some 110 specimens of a photo-reconnaissance version designated **F9F-8P (RF-9J)** appeared, whilst the Cougar also lent itself to the training of future naval aviators; a prototype two-seat **YF9F-8T** was followed by no less than 400 **F9F-8T (TF-9J)** production examples, some of which remained in use with Naval Air Training Command until well into the 1970s.

As far as front-line units were concerned, the Cougar disappeared from the scene early in 1960, the last operational version being the F9F-8P, but many continued to fly long after that date with the Reserve Force and with Air Training Command. Surplus aircraft became **F9F-6K (QF-9F)** and **F9F-6K2 (QF-9G)** target drones or **F9F-6D (DF-9F)** drone directors.

Specification

Grumman F9F-8 Cougar

Type: carrierborne fighter and attack aircraft

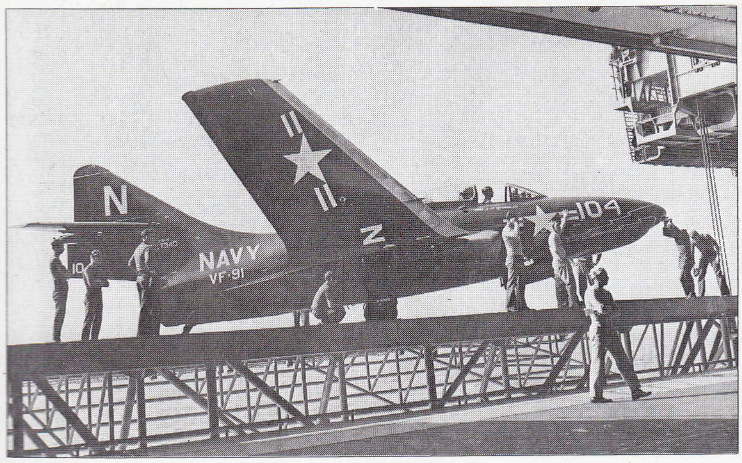
Powerplant: one 3289-kg (7,250-lb) thrust Pratt & Whitney J48-P-8A turbojet

Performance: maximum speed 1033 km/h (642 mph) at sea level; service ceiling 12800 m (42,000 ft); range 1931 km (1,200 miles)

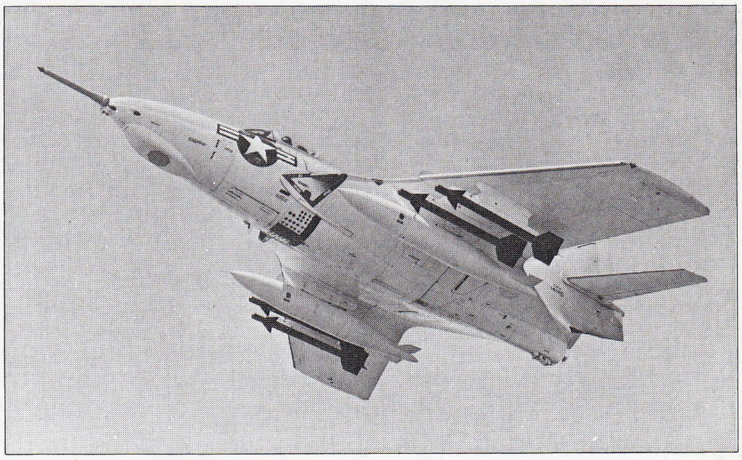
Weights: empty 5382 kg (11,866 lb); maximum take-off 11232 kg (24,763 lb)

Dimensions: span 10.52 m (34 ft 6 in); length 12.85 m (42 ft 2 in); height 3.72 m (12 ft 2.5 in); wing area 31.31 m^2 (337 sq ft)

Armament: four 20-mm cannon, plus up to 1814 kg (4,000 lb) of external ordnance including bombs, rockets and napalm tanks



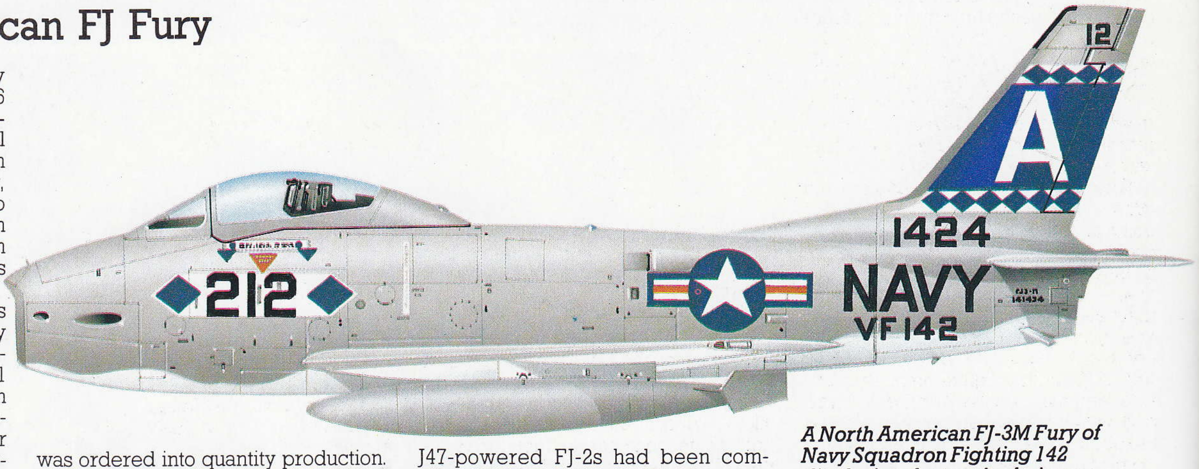
The earlier Cougars, in this case an F9F-6, featured slimmer wings, evident in this photograph. This aircraft is seen on the lift of USS Hornet *whilst the carrier was part of the 7th Fleet sailing in the Far East.*



Illustrating the broad stubby wings of the F9F-8, this Cougar carries four of the new Sidewinder air-to-air missiles and two fuel tanks on its underwing pylons. The F9F-8 was also built in a reconnaissance version (F9F-8P).

USA

North American FJ Fury

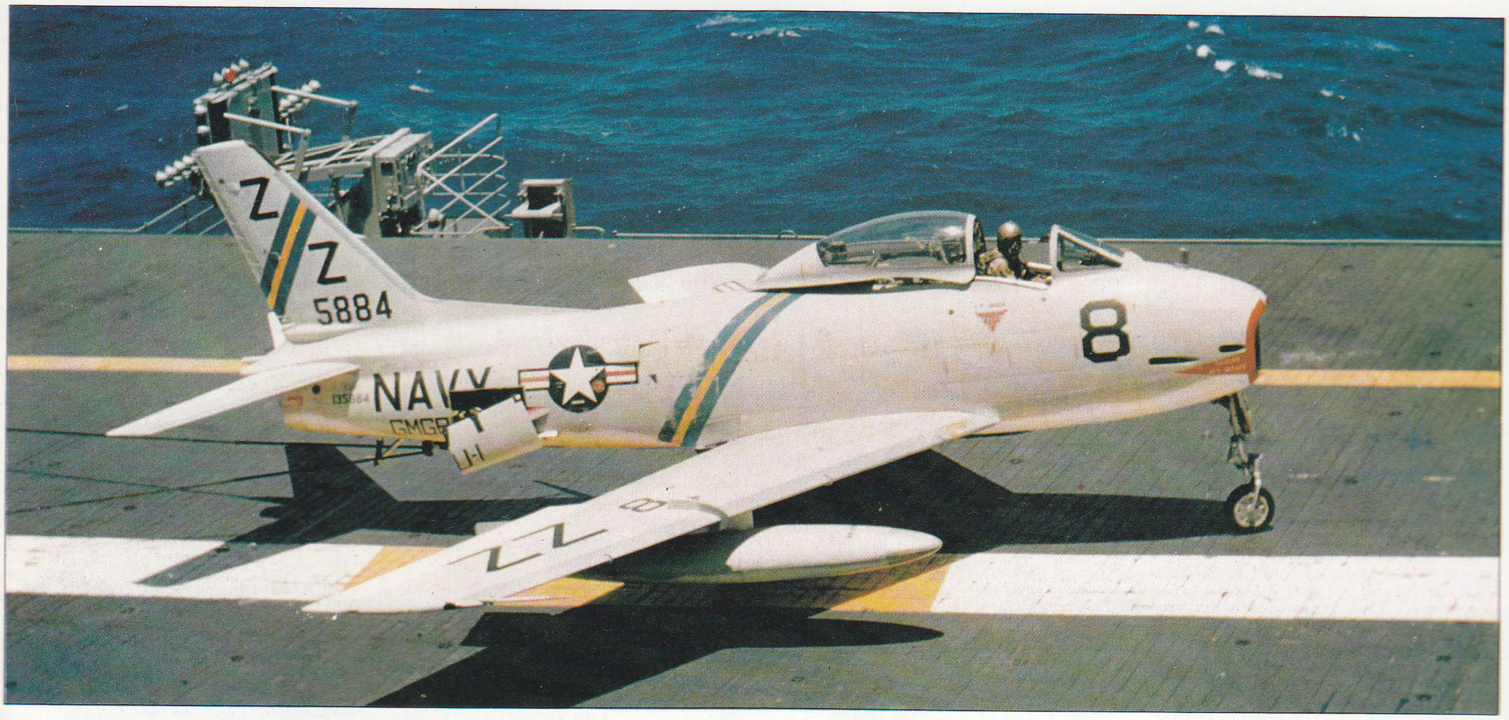


A North American FJ-3M Fury of Navy Squadron Fighting 142 displaying the type's obvious descent from the F-86 Sabre. The FJ-3M was Sidewinder-capable, and earlier machines were upgraded to this standard.

A navalized variant of the remarkably successful North American F-86 Sabre, the swept-wing **North American FJ-2 Fury** brought the clock full circle, for the Sabre itself evolved from the original straight-wing **FJ-1 Fury**, this being the first US jet fighter to operate from an aircraft-carrier in squadron strength, an event which took place in early 1948 with VF-51 as the unit concerned.

The FJ-1's operational career was very short (it very quickly giving way to the rather more advanced Grumman Panther), and it was not until 1951 that the name Fury reappeared, when the US Navy requested North American to convert a pair of F-86Es for carrier trials. The first of these, designated **XFJ-2**, took to the air for its maiden flight on 19 February 1952, and with the successful conclusion of initial carrier qualification trials aboard the USS *Midway* in that summer, this type was ordered into quantity production.

Deliveries to fleet units got under way in January 1954 when Marine Fighter Squadron VMF-122 at Cherry Point began to convert from the F9F-5 Panther, but only 200 General Electric J47-powered FJ-2s had been completed by the spring of 1954 when production switched to the J65-powered **FJ-3**, which eventually became the most widely used version, no less than 538 rolling from the assembly line. By



A FJ-3 Fury from a test squadron completes a trap with the aid of arrester gear and the aircraft's divebrakes mounted on the rear fuselage. The Fury lasted on into the 1960s in a variety of roles, including that of drone-director.

far the majority (458 in all) were completed as FJ-3s, but the advent of efficient missiles resulted in the final 80 appearing as **FJ-3M** fighters with provision for two heat-seeking AIM-9A Sidewinders; a substantial number of early production FJ-3s was later upgraded to this configuration.

The penultimate variant, the **FJ-4**, was in many ways virtually a new aircraft, featuring a much deeper fuselage and revised wing planform, and this was first flown in prototype form during October 1954, 150 production machines being followed by 222 examples of the more capable **FJ-4B**. This was optimized for close support tasks and incorporated a strengthened airframe, additional underwing hardpoints and a low-altitude bombing system. Introduced to service in 1957, the FJ-4B was finally retired from the front-line inventory in late 1962 although it continued to fly with second-line squadrons and Reserve units for several more years, the post-1962 designations being **F-1C** (FJ-3), **MF-1C** (FJ-3M), **F-1E** (FJ-4) and **AF-1E** (FJ-4B). Lesser-used variants were the **FJ-3D** and **FJ-3D2** (**DF-1C** and **DF-1D**) drone-director conversions.

Specification

North American FJ-4B Fury

Type: carrierborne fighter-bomber

Powerplant: one 3493-kg (7,700-lb) thrust Wright J65-W-16A turbojet

Performance: maximum speed 1094 km/h (680 mph) at sea level; service ceiling 14265 m (46,800 ft); range 4458 km (2,770 miles) with maximum external fuel

Weights: empty 6250 kg (13,778 lb); maximum take-off 12701 kg (28,000 lb)

Dimensions: span 11.91 m (39 ft 1 in); length 11.07 m (36 ft 4 in); height 4.24 m (13 ft 11 in); wing area 31.46 m² (338.66 sq ft)

Armament: four 20-mm cannon, plus up to 2722 kg (6,000 lb) of external ordnance including bombs, rockets and air-to-surface missiles

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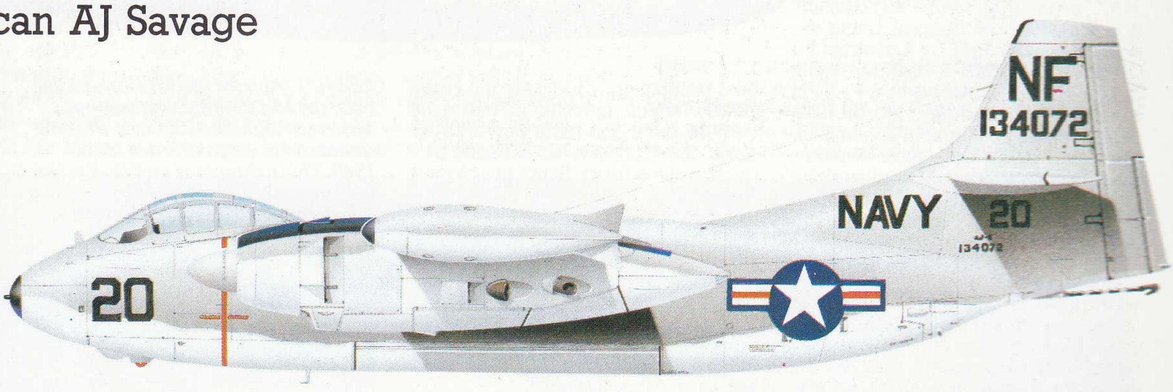
USA

North American AJ Savage



Of mixed propulsion, the North American AJ Savage was designed for the delivery of nuclear weapons from a carrier. Although replaced quickly in this role by the Skywarrior, Savages continued in the role of tanker.

The first heavy attack type to see service from aircraft-carriers of the US Navy, the **North American AJ Savage** used a novel method of propulsion, two Pratt & Whitney radial engines being augmented by a tail-mounted Allison J33 turbojet. In practice the type saw only limited use in the strategic bombing role for which it had been designed, being replaced from the mid-1950s onwards by the Douglas A3D Skywarrior, but several were subsequently modified to serve as inflight-refuelling tankers with a hose-and-reel unit in place of the turbojet.

Development began soon after World War II came to an end. An initial contract for three prototype **XAJ-1** aircraft was awarded to North American in late June 1946, and construction of these got under way almost immediately although more than two years were to elapse before the Savage took to the air for the first time on 3 July 1948. In its original guise the Savage was manned by a crew of three and was intended to carry a 4536-kg (10,000-lb) weapon load in an internal bomb bay in the aircraft's belly.

Production-configured aircraft began to enter service with Composite Squadron VC-5 in mid-September 1949, but it was not until the end of August 1950 that this unit was considered operationally ready, this marking the climax of several months of seaborne trials aboard the USS *Coral Sea*. The first variant to see service with the US Navy was the **AJ-1**, of which 40 were built, and these were followed by 70 examples of the **AJ-2** which featured slightly more powerful radial engines as well as increased fuel capacity, a slightly longer fuselage and a taller fin and rudder to improve handling qualities. The final new-build version was the **AJ-2P**, which was intended for photographic reconnaissance and thus incorporated nose radar and a battery of no less than 18 cameras for use by day and night. A total of 30 AJ-2Ps was built, this being the last model to see squadron service, not being retired from the active inventory until the beginning of 1960. In 1962 surviving AJ-1 and AJ-2 aircraft were redesignated **A-2A** and **A-2B** respectively.

Specification

North American AJ-2 Savage

Type: carrierborne nuclear strike aircraft

Powerplant: two 2,500-hp (1864-kW) Pratt & Whitney R-2800-48 radial piston engines and one 4,600-lb (2087-kg) thrust Allison J33-A-10 turbojet

Performance: maximum speed 628 km/h (390 mph); service ceiling 12190 m (40,000 ft); range 3540 km (2,200 miles)

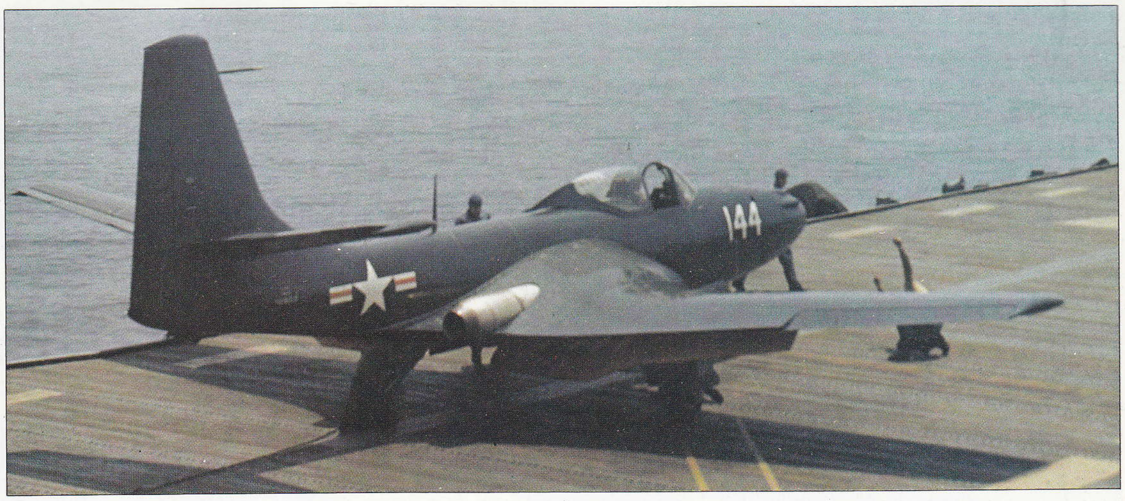
Weights: empty 12247 lb (27,000 lb); maximum take-off 23396 kg (51,580 lb)

Dimensions: span 21.77 m (71 ft 5 in); length 19.23 m (63 ft 1 in); height 6.22 m (20 ft 5 in); wing area 77.62 m² (835.5 sq ft)

Armament: up to 4536 kg (10,000 lb) of bombs carried internally

USA

McDonnell FH-1 Phantom



Possessing only marginal performance, the McDonnell FH (FD) Phantom was quickly replaced by more sophisticated jets. However, it was the US Navy's first jet fighter.

First production aircraft designed by the company, the **McDonnell FH-1 Phantom** was notable in being also the first jet designed to operate from an aircraft-carrier. The US Navy placed the original letter of intent on 30 August 1943, and the first prototype made its initial flight from St Louis airport, Lambert Field, on 26 January 1945. The type was certainly not over-powered, because the final propulsion system, adopted after many studies of alternatives, was two slim Westinghouse 19B engines buried in the wing roots. Later produced in small numbers as the J30, these were hardly enough for adequate performance. The first flight is thus all the more remarkable in that, at that time, Westinghouse had been able to deliver only one engine, and one of the wing-root engine bays was empty! At that time McDonnell's US Navy designator letter was D, the prototype being the **XFD-1**, but because of confusion with Douglas (which also used letter D) McDonnell was assigned letter H, so that the 60 production Phantoms were designated FH-1. They were gentle and easy to fly, and on 21 July 1946 a prototype landed on and took off from USS *Franklin D. Roosevelt* (a British de Havilland Sea Vampire had made carrier trials the previous year). The production aircraft were delivered from December 1946 served mainly with US Marine fighter squadron VMF-122. Their fault was lack of performance and lack of firepower, and the next-generation F2H Banshee was a vast improvement on both counts.

Specification

McDonnell FH-1 Phantom

Type: single-seat carrier-based fighter

Powerplant: two 726-kg (1,600-lb) thrust Westinghouse J30-20 turbojets

Performance: maximum speed 771 km/h (479 mph) at sea level and 813 km/h (505 mph) at high altitude; service ceiling 13000 m (43,000 ft); range 1110 km (690 miles) without belly drop tank

Weights: empty 3031 kg (6,683 lb); maximum take-off 5459 kg (12,035 lb)

Dimensions: span 12.42 m (40 ft 9 in); length 11.81 m (38 ft 9 in); height 4.32 m (14 ft 2 in); wing area 25.64 m^2 (276 sq ft)

Armament: four 12.7 mm (0.5-in) machine-guns in upper part of nose

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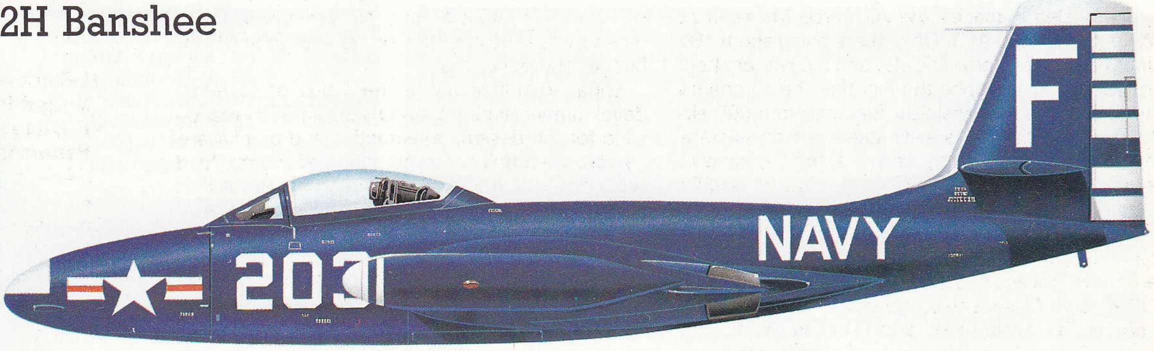
USA

McDonnell F2H Banshee



Above: Flying for the first time as the F2D, the McDonnell Banshee was soon redesignated F2H and was first delivered to a squadron in March 1949. This example is an F2H-2 which featured more powerful engines and longer fuselage than the first model.

Another early jet-powered type to see service with the US Navy, the **McDonnell F2H Banshee** began life even before the end of World War II when the US Navy requested an improved version of the FH-1 Phantom. Bearing a strong resemblance to the earlier type, the Banshee was rather larger and more powerful, flying in prototype form for the first time as the **XF2D-1** from St Louis, Missouri, on 11 January 1947. Initial trials were successfully accomplished, McDonnell being rewarded in May 1947 by a contract for 56 production **F2H-1** fighters, which began to enter service with VF-171 of the Atlantic Fleet during March 1949.

Like the later Phantom II, the Banshee proved to be a most versatile machine, satisfactorily undertaking day and night fighter tasks, all-weather interception, close air support and photographic reconnaissance with seemingly equal facility in the course of the next 10 years. Following on from the original F2H-1 came the **F2H-2**, which had slightly more powerful engines and a longer fuselage. Production of the basic F2H-2 totalled 364, some of which were later modified to **F2H-2B** standard for close support tasks whilst 14 examples of the **F2H-2N** specialized night-fighter derivative were also completed, these incorporating airborne interception radar. For reconnaissance, 58 **F2H-2P** aircraft were completed as new, these being unarmed and featuring a battery of cameras in an elongated nose section.

Production then switched to the **F2H-3** (in 1962 redesignated **F-2C**), which was optimized for all-weather fighter duties, the first of 250 entering service during April 1952 and being easily recognizable by virtue of a fuselage- rather than fin-mounted tailplane, but plans to acquire the **F2H-3P** for reconnaissance were abandoned. The final production model was the **F2H-4 (F-2D)**, which introduced improved APG-41 radar and more powerful engines, the 150th and last bringing production of the trusty 'Banjo' to a close in August 1953.

Apart from serving with the US Navy and US Marine Corps, 39 F2H-3s were supplied to Canada in 1955, these operating from HMCS *Bonaventure* until September 1962, when the last examples were retired from service.

Specification

McDonnell F2H-3 Banshee

Type: carrierborne all-weather interceptor

Powerplant: two 1633-kg (3,600-lb) thrust Westinghouse J34-WE-36 turbojets

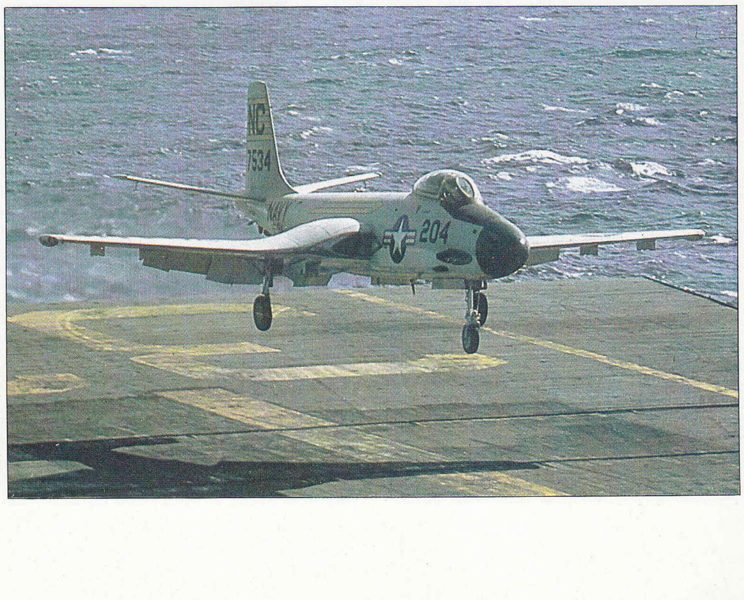
Performance: maximum speed 933 km/h (580 mph) at sea level; service ceiling 14205 m (46,600 ft); range 1883 km (1,170 miles)

Weights: empty 5980 kg (13,183 lb); maximum take-off 11437 kg (25,214 lb)

Dimensions: span 12.73 m (41 ft 9 in); length 14.68 m (48 ft 2 in); height 4.42 m (14 ft 6 in); wing area 27.31 m^2 (294 sq ft)

Armament: four 20-mm cannon, plus (Canadian aircraft only) two AIM-9 Sidewinder air-to-air missiles

Below: An F2H-3 Banshee about to make a text-book trap. The aircraft saw much service in Korea, where both the Navy and the Marine Corps used the aircraft for air combat and ground attack. In its F2H-2P version, the Banshee was one of the most important reconnaissance aircraft of the war.



US Air Force

Part 10

Once a weapons system (aircraft or missile) attains operational status the Air Force Logistics Command (AFLC) assumes responsibility for purchase, supply and maintenance requirements on a global basis. Headquartered at Wright-Patterson, AFLC is largely civilian-manned, with most of the personnel assigned to the five Air Logistics Centers (ALCs) located in the continental USA. These are concerned mainly with the performance of overhaul and modification work, and each ALC usually has sole responsibility for several specific types, an example being provided by the Ogden ALC at Hill AFB, Utah, which deals with the F-4 Phantom and the F-16 Fighting Falcon, Minuteman and Titan ICBMs, and guided weapons such as the AGM-65 Maverick. Other ALCs are to be found at Tinker AFB, Oklahoma; McClellan AFB, California; Kelly AFB, Texas; and Robins AFB, Georgia, but perhaps the best-known AFLC activity is the Military Aircraft Storage and Disposition Center (MASDC) at Davis-Monthan AFB, Arizona, where roughly 5,000 aircraft from all elements of the US armed forces are held in open storage at any given time. Often erroneously referred to as 'the boneyard', MASDC is an extremely sound investment and one that provides a significant return by virtue of the fact that it is an important repository for valuable aircraft spares, especially for older types which are no longer in production.

AFLC also manages the Air Force Museum at Wright-Patterson AFB, Ohio, there being about 100 aircraft and missiles on display and many more held in reserve. But despite the fact that the command nominally has responsibility for close to 6,000 aircraft at any time it is essentially not an aircraft-operating organization, and has only a handful assigned, including some F-4s, F-106s and T-38s plus one F-15.

Increasing sophistication of the combat echelons has been matched by improvements to the many and varied means of communication available to the USAF, both for routine day-to-day running of affairs and for the exercise of command and control in times of war. Responsibility for installing, maintaining and operating such systems is entrusted to the Air Force Communications Command (AFCC), a large organization with several hundred operating sites whose brief extends throughout the communications spectrum, encompassing such diverse aspects as air traffic control, navigational aids, telecommunications equipment and radars. Headquartered at Scott AFB, Illinois, AFCC's organization centres around a total of six so-called Communications Areas (four in the continental USA plus one each in the Pacific and Europe) although there are also several independent elements, comprising groups or squadrons tasked with meeting the special needs of certain areas of major USAF activity.

Essentially a ground-based command, AFCC does operate a small fleet of aircraft, assigned to three Facilities Checking Squadrons which ensure that certain navaids and ground-controlled approach systems are correctly calibrated and functioning satisfactorily. Co-located at Scott, the 1868th FCS has four examples of the Lockheed C-140A JetStar and is responsible for the entire USA, whilst the other two squadrons (the 1867th FCS at Clark AB in the Philippines and the 1868th FCS at Rhein-Main AB in West Germany) each have a single Rockwell T-39A Sabreliner.

Although not engaged in operational duty in the more usually accepted context of the term, there can be little doubt that the Air Force Systems Command (AFSC) plays an important role in the modern US Air Force, and some idea of its true worth can be gained from the fact that it usually receives close to one-third of the total annual USAF budget appropriations.

Engaged principally in the fields of research, development, test and evaluation, AFSC is responsible for the design, construction and purchase of aircraft, weapons and other items of military hardware, controlling some 200 operating locations from its headquarters at Andrews AFB, Maryland. Many of these locations are extremely small, consisting of just a few scientists or technicians, but AFSC also has several major centres of activity. Probably the best known of these is the Air Force Flight Test Center at Edwards AFB, California, for it is here that new aircraft are exhaustively evaluated before production authorization. Such work is generally undertaken by temporary organizations known as Joint Test Forces made up of personnel from the civilian contractor responsible for the product under review, from the designated user command and from other AFSC components such as the Aeronautical Systems Division at Wright-Patterson AFB, Ohio.

Finally, with the future very much in mind, the US Air Force recently established a new command, the first for many years. Known as Space Command, this is at present engaged in activities of what might best be described as a passive nature, monitoring the ever increasing number of satellites in orbit and keeping an eye on all the other debris known to be circling the Earth, from headquarters in the Cheyenne Mountains North American Air Defense Command complex. At present far removed from the type of pyrotechnics associated with 'Star Wars' and other films of that genre, Space Command may, however, acquire the means to destroy other satellites in the foreseeable future, for it is known that research work into the possibilities of using lasers as weapons is making progress.

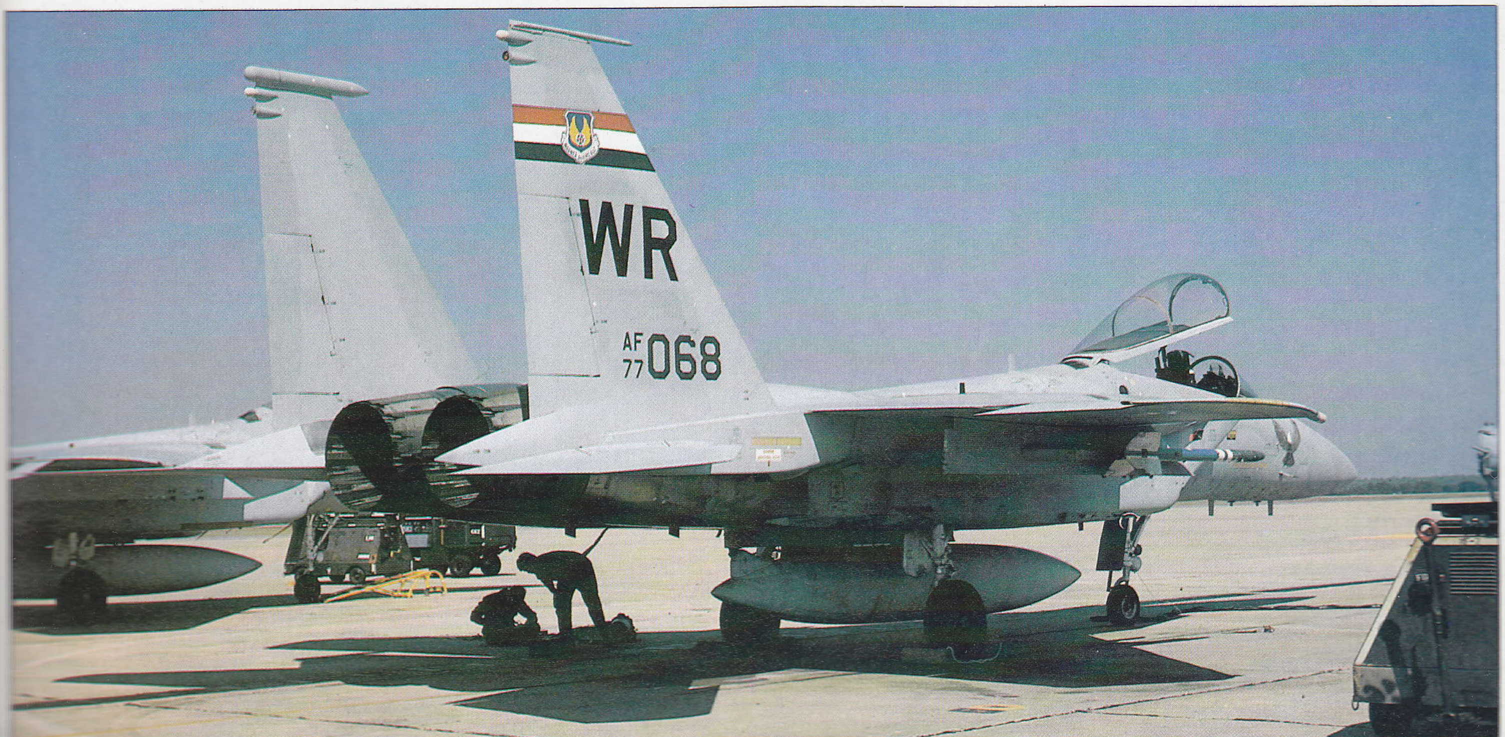
If (or perhaps it should be when) such weapons become available, it will be fair to say that the sky is no longer the limit as far as the US Air Force is concerned.

AIR FORCE LOGISTICS COMMAND

HEADQUARTERS WRIGHT-PATTERSON AFB, Oh

- Air Force Acquisition Logistics Division, Wright-Patterson AFB, Oh
- AFLC International Logistics Center, Wright-Patterson AFB, Oh
- USAF Medical Center, Wright-Patterson AFB, Oh
- Air Force Museum, Wright-Patterson AFB, Oh
- Air Force Contract Maintenance Center, Wright-Patterson AFB, Oh
- 2750th Air Base Wing, Wright-Patterson AFB, Oh

Bearing the unofficial code combination 'WR' for Warner-Robins ALC, this McDonnell Douglas F-15A Eagle carries the Air Force Logistics Command badge on the fin and is the only example of this type assigned to AFLC.



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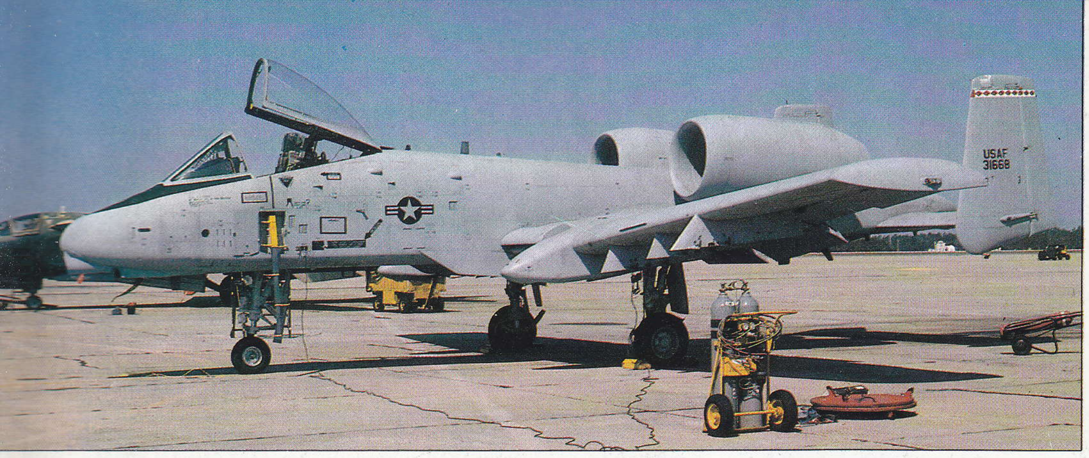

The Air Force Systems Command fleet contains examples of most types currently to be found in the USAF inventory. This Fairchild Republic A-10A is from the Armament Development and Test Center at Eglin AFB, and is assigned to the 3246th TW.

- Aerospace Guidance and Metrology Center, Newark AFS, Oh
- Ogden ALC, Hill AFB, Ut (F-4, F-16)
- Oklahoma City ALC, Tinker AFB, Ok (A-7, B-1, B-52, C-135, C-137, E-3, E-4)
- Sacramento ALC, McClellan AFB, Ca (A-10, C-12, F-111, T-33, T-39)
- San Antonio ALC, Kelly AFB, Tx (C-5, C-9, F-5, F-106, A/T-37, T-38, T-41, T-43, O-2, OV-10)
- Warner-Robins ALC, Robins AFB, Ga (C-123, C-130, C-140, C-141, F-15, H-1, H-3, H-53)
- Military Aircraft Storage and Disposition Center, Davis-Monthan AFB, Az (handles aircraft of all US armed services)

Note: aircraft types only listed for each ALC; most also handle engines and missiles.

AIR FORCE COMMUNICATIONS COMMAND

HEADQUARTERS SCOTT AFB, Il

- Continental Communications Division, Griffiss AFB, NY
- Strategic Communications Division, Offutt AFB, Ne
- Tactical Communications Division, Langley AFB, Va
- European Communications Division, Kapaun AS, West Germany.
    - 1868th FCS, Rhein-Main AB, West Germany (T-39A)
- Pacific Communications Division, Hickam AFB, HI
    - 1867th FCS, Clark AB, Philippines (T-39A)
- Airlift Communications Division, Scott AFB, Il
- Space Communications Division, Colorado Springs, Co
- Air Force Computer Acquisition Center, Hanscom AFB, Ma
- Air Force Data Service Center, Washington, DC
- Air Force Data Systems Design Center, Gunter AFS, Al
- Air Force Data Systems Evaluation Center, Gunter AFS, Al
- Air Force Automated Systems Project Office, Gunter AFS, Al
- Air Force Communications Computer Programming Center, Tinker AFB, Ok
- Engineering Installation Center, Tinker AFB, Ok
- Federal Computer Performance Evaluation and Simulation Center, Alexandria, Va
- Air Force Central NOTAM Facility, Carswell AFB, Tx
- San Antonio Data Service Center, San Antonio, Tx
- 1815th Test and Evaluation Squadron, Scott AFB, Il
- 1866th Facility Checking Squadron, Scott AFB, Il (C-140A)
- 1872nd School Squadron, Keesler AFB, Ms
- 1980th Communications Group, Fort Myer, Va
- 2000th Management Engineering Squadron, Scott AFB, Il
- 2199th Computer Services Squadron, Scott AFB, Il

Note: This is a very much simplified organization table, omitting many units which are active at Air Force Bases and other facilities throughout the world.

AIR FORCE SYSTEMS COMMAND

HEADQUARTERS ANDREWS AFB, Md

- Air Force Contract Management Division, Kirtland AFB, NM
- Aerospace Medical Division, Brooks AFB, Tx
- Foreign Technology Division, Wright-Patterson AFB, Oh
- Air Force Flight Test Center, Edwards AFB, Ca
    - 6512th Test Squadron (various aircraft types)
    - 6514th Test Squadron (DC-10E/H at Hill AFB, Ut)
- Arnold Engineering Development Center, Arnold AFS, Tn
- Aeronautical Systems Division, Wright-Patterson AFB, Oh
    - 4950th Test Wing – various aircraft types
- Armament Division, Eglin AFB, Fl
    - 3246th Test Wing – various aircraft types
- Space Division, Los Angeles AFS, Ca
    - Space and Missile Test Organization, Vandenberg AFB, Ca
        - Western Space and Missile Center
        - Eastern Space and Missile Center (at Patrick AFB, Fl)
    - Air Force Satellite Control Facility, Sunnyvale AFS, Ca
    - Air Force Space Technology Center, Kirtland AFB, NM
    - 6594th Test Group, Hickam AFB, HI
        - 6593rd Test Squadron (C-130B, HC-130H, HH-53C)
- Ballistic Missile Office, Norton AFB, Ca
- Electronic Systems Division, Hanscom AFB, Ma
    - Rome Air Development Center, Griffiss AFB, NY (various aircraft types)

SPACE COMMAND

HEADQUARTERS PETERSON AFB, Co

- 1st Space Wing, Peterson AFB, Co
    - 1st Space Support Group, Peterson AFB, Co
        - 16th Surveillance Squadron, Shemya AFB, Ak
        - 17th Surveillance Squadron, San Miguel, Philippines
        - 6th Missile Warning Squadron, Otis AFB, Ma
        - 7th Missile Warning Squadron, Beale AFB, Ca
        - 13th Missile Warning Squadron, Clear AFS, Ak
        - 20th Missile Warning Squadron, Eglin AFB, Fl
        - Det 1, Socorro City, NM
        - Det 2, Choejong-San, South Korea
        - Det 3, Maui, HI
        - Det 5, Concrete, ND
        - Det 9, Kapaun, West Germany
        - 12th Missile Warning Group, Thule AB, Greenland
        - 1015th Air Base Group, Sondrestrom, Greenland
        - 4000th Satellite Operations Group, Offutt AFB, Ne
- Aerospace Defense Center, Peterson AFB, Co
    - Air Defense Operations Center, Cheyenne MountainComplex
    - 3rd ACCS, Tinker AFB, Ok
    - 1022nd Support Squadron, North Bay, Ontario, Canada
- Cheyenne Mountain Support Group, Cheyenne Mountain Complex
    - 1010th Special Security Squadron, Cheyenne Mt Complex
    - 1010th Civil Engineering Squadron, Cheyenne Mt Complex
- System Integration Office, Peterson AFB, Co
- 1014th Contracting Squadron, Peterson AFB, Co
- 1020th Computer Services Squadron, Peterson AFB, Co

One of a handful of Lockheed C-140A JetStars assigned to the 1866th Facility Checking Squadron at Scott AFB, Illinois. This aircraft features the drab camouflage scheme applied to the small number of C-140s and Rockwell T-39s operated.